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TROPICAL DISEASES BULLETIN

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1
(Telephone: MUSEUM 3041)

Price 5/6 net] *Entered as Second Class Matter in the U.S.A. Post.* Annual Subscription (Jan.–Dec.) 50/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 49] 1952 [No. 4

SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

[*Continued from p.* 219]

Treatment

The Ministry of Transport (p. 12) have issued a 30-page pamphlet for ship surgeons, on the prevention, diagnosis and treatment of malaria.

The World Health Organization Expert Committee on Malaria (p. 2) issued a report of its third session (1949) which covers control, therapy, insecticides and organization. This should be read in full. Treatment schedules are given in some detail.

In a lecture given in 1945 SHANNON (p. 707) discusses the study of anti-malarial drugs and their action, in the light of investigations made during the war, and RIGDON and BRESLIN (p. 234) show, from a survey of the literature, that the mode of action may be in part indirect, by an action on the erythrocytes themselves.

SMITH (p. 441) describes a short toxicity test which he has used in the investigation of certain anti-malarial drugs.

PIZZILLO (p. 518) discusses the use of adrenaline in malaria.

The method of treating malaria by a single massive dose of one of the anti-malarial drugs has been reported by several workers. HALAWANI and BAZ (p. 13), using several drugs, claim clinical cure and few relapses in *P. vivax* infections, and CANET (p. 440) has had success with 1·2 gm. nivaquine in *P. vivax* and *P. falciparum* infections, though he does not advocate the method for hospital practice. CHAUDHURI *et al.* (p. 711) have used chloroquine, camoquin and proguanil in this way, each with success, but think that chloroquine is the most satisfactory. DE LUCENA (p. 863) and HOEKENGA (p. 863) write favourably of a single dose of 1·0 gm. camoquin.

Quinine, of course, continues to be used, and WINCKEL (p. 121) thinks that the Expert Committee of the World Health Organization has underrated its value, in favour of the synthetic drugs. BARANGER and FILER (p. 716) claim that quinine and certain extracts of cinchona possess definite activity against exo-erythrocytic forms (of *P. gallinaceum*). A new preparation of quinine

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

sulphate with dehydrocholic acid, which is reported to be quickly absorbed, and economical, is described by CHAKRAVORTY and BASU (p. 12). CASILE (p.438) discusses tetanus after injection of quinine.

YANG (p. 524) gives the names of 6 plants in China which possess anti-malarial action.

Synthetic drugs.—SCHNEIDER (p. 612) contributes a long article on the pharmacology and therapeutic action of these drugs, and DRUCKER (p. 23) a study of the action of mepacrine and chloroquine on the blood forms of various avian plasmodia.

Mepacrine.—KHAN (p. 1067) treats cerebral malaria with intramuscular methyl-sulphonate-mepacrine, and intravenous nicotinic acid and glucose (given very slowly), and reports better results than with intravenous quinine. In an enquiry into the effects of mepacrine in pregnancy, DE ROTHSCHILD and LÉVY (p. 709) injected it into pregnant rats. The number of embryos was apparently reduced, and there were some abortions, but probably not as a result of direct action on the uterus.

A substance similar to mepacrine, and having rather less anti-malarial action but no unpleasant side effects [in a very small series of patients] has been synthesized by ASANO *et al.* (p. 1086).

Proguanil.—The Malaria Advisory Board of the Federation of Malaya (p.122) has issued a circular on the use of proguanil. Emphasis is laid on the prevention of development of resistance to proguanil in strains of *P. falciparum*. This has not hitherto been observed with *P. vivax* or *P. malariae* infections.

Proguanil proved satisfactory for use in African children in the Belgian Congo (GEUKENS, p. 522).

BANERJIE (p. 1069) attributes acute abdominal pain to proguanil, in 5 patients.

Chloroquine.—Favourable comments on chloroquine are given by LOZANO MORALES (p. 123), who uses short courses, BRITTO and COTRIM (p. 235), and SCOTT (p. 123), who has used it intravenously for *P. falciparum* infections. He gave only one injection in each case, at an average dose of 7·6 mgm. of base per kgm., given very slowly. The chief immediate symptoms were dizziness and drowsiness, and there was usually a temporary fall in systolic blood pressure. The therapeutic effects were good. HULSHOFF (p. 712) treated patients (mostly repatriated soldiers from the Far East) with chloroquine and pamaquin, with a relapse rate of only 7 per cent.

Camoquin ; Nivaquine ; Sontochin.—BERTAGNA (p. 1068) sums up the qualities of camoquin, which acts on the asexual forms of malaria parasites and on the sexual forms of *P. vivax* (but not of *P. falciparum*). It is a good suppressant. Single-dose treatment (adults 0·6 gm.) is favoured, but it can be given more continuously in appropriate doses.

In Assam, and in *P. falciparum* and *P. vivax* infections, HAMILTON (p. 711) found treatment with chloroquine and camoquin useful, though it is necessary to continue prophylactic doses to avoid relapses of *P. vivax*. He thinks that a course of proguanil followed by proguanil prophylaxis is equal in action to any other drug for treatment and prevention of *P. falciparum* infections.

CODA (p. 780) writes favourably of camoquin, and (p. 780) has treated with a single dose of nivaquine 15 patients infected with *P. vivax*, adult dose 0·6 gm. The results were satisfactory.

MENK and MOHR (p. 614) have used sontochin with success in the various forms of malaria. The dose may be 0·1 gm. 3 times each day for 7 days, or 0·2 gm. 3 times each day for 5 days, and plasmoquine may be given at the same time or after it.

Pamaquin ; Pentaquine ; Primaquine.—The anti-malarial effect of pamaquin is probably due to a metabolic product, and JOSEPHSON *et al.* (p. 862)

have isolated such a product from the faeces of chickens to which the drug had been given. Its anti-malarial activity was greater than that of pamaquin itself. BRODIE and UDENFRIEND (p. 14) have isolated from the urine of treated dogs a substance which is probably responsible for the toxic effects of pamaquin, but they have not yet determined if this is the anti-malarial fraction.

MOST (p. 520) points out the value of a 14-day course of quinine and pamaquin, or quinine and pentaquine, in preventing relapse of *P. vivax* infections, and STRAUS and GENNIS (p. 614) write similarly of a 14-day course of quinine (0·6 gm. every 8 hours) and pentaquine (10 mgm. base every 8 hours) in *P. vivax* malaria. COATNEY *et al.* (p. 124) agree that quinine and pentaquine tend to prevent relapses of *P. vivax*, but found that these drugs did not prevent infection if given before and for 6 days after exposure, and they note that pentaquine may give rise to toxic effects.

EDGCOMB *et al.* (p. 440) describe primaquine, and show that with the Chesson strain of *P. vivax* it is more active and effective than pamaquin or isopentaquine. When given with quinine it prevented relapse in all cases.

Other drugs.—Aureomycin has some action on malaria, clearing the blood of parasites in about 3–7 days (RUIZ SANCHEZ *et al.*, p. 1069), but apart from some lengthening of the incubation periods, IMBODEN *et al.* (p. 523) report no beneficial effect of aureomycin and chloramphenicol in prophylaxis of induced *P. vivax* malaria. Penicillin and dihydrostreptomycin had no action.

Suppressive Treatment

JANSSENS *et al.* (p. 864) have done important research on African children in the Belgian Congo. They show that supervised administration of mepacrine (0·1 gm. twice each week), proguanil (0·1 gm. once or twice each week, preferably the latter) or chloroquine diphosphate (0·25 gm. once each week) gave excellent results in reducing the incidence of malaria and the infant mortality rate, and in improving the general health. The doses quoted are for children aged 10 years or more ; for younger children smaller doses were given. Although the disease was suppressed the process of premunition (at least with mepacrine) appeared to proceed satisfactorily. Similarly HIMPE and PIERQUIN (p. 125) found proguanil or chloroquine once each week satisfactory in a village in the Belgian Congo.

BRUCE-CHWATT (p. 710) has used mepacrine, proguanil or chloroquine in African children infected with *P. falciparum*, giving either a single suppressive dose, or a course of half the adult therapeutic dose and lasting 3–5 days. Chloroquine had the most rapid action, followed by mepacrine and proguanil, and there were differences in the responses of children to proguanil and mepacrine, but not to chloroquine. Parasites disappeared most quickly in children with large spleens. More relapses occurred after proguanil than after the other two, but only proguanil rendered gametocyte-carriers non-infective to mosquitoes.

In Egypt, HALAWANI and BAZ (p. 13) successfully gave weekly doses of mepacrine, proguanil, nivaquine or camoquin, and in Bengal CHAUDHURI (p. 1070) has found suppressive proguanil, chloroquine and camoquin valuable in rural areas where control of anophelines is impracticable.

For mepacrine alone, both RUGE (p. 125), near the coast of the Black Sea, and ZSCHUCKE (p. 861), in Greece, found a daily dose of 0·06 gm. insufficient, and for military establishments in Turkey NOYAN (p. 1069) advocates a régime of 0·3 gm. daily for 5 successive days at intervals of 2 weeks.

SOKAL (p. 121) discusses intolerance to mepacrine in suppressive doses and describes three successful efforts to overcome it by temporary administration of sedatives while giving the first small, but increasing, doses.

In the Punjab RAFI and SHAH (p. 1071) found proguanil satisfactory in adult doses of 300 mgm. once weekly or 100 mgm. twice weekly, but in Tanganyika Territory MACLEOD (p. 442) found that *P. falciparum* broke through in several Europeans regularly taking 100 mgm. each day. In Java resistance to proguanil developed in strains of *P. falciparum* and *P. malariae*, during an experiment in drug suppression, but VAN GOOR *et al.* (p. 325) found chloroquine more successful. GUNTHER (p. 523) in New Guinea finds proguanil satisfactory, but for treatment of attacks it should be reinforced with quinine.

With the Chesson strain of *P. vivax*, COOPER *et al.* (p. 439) found that proguanil given once each week was effective in suppression, and, if given daily from the day of infection, did not lead to resistance. Proguanil, even in large doses, did not actually cure the infection.

After two years' experience of proguanil in suppression, PAUL *et al.* (p. 443) conclude that, although it is useful, the best general approach to malaria in Formosa is through the use of residual insecticides and treatment of overt malaria with the new drugs.

Control

RUSSELL (p. 606) discusses the progress and implications of malaria control, in a Presidential Address which should be read in full.

An account of the Report on the Malaria Conference in Equatorial Africa (W.H.O. and Commission for Technical Co-operation in Africa South of the Sahara) appears on p. 697. This Conference recommended immediate attempts to control malaria in Africa by modern methods, without waiting for further experiments. A very large reduction in transmission by *A. gambiae* can be achieved by residual insecticides, but in the meantime drug prophylaxis will continue to play a prominent part [not a permanent part as in the abstract] in anti-malaria measures. If outbreaks of malaria should occur, they can be controlled by means of drugs and insecticides with reasonable speed. The Conference urged the formation of specialist malaria services in the various countries, and the provision of courses in malariology. A list of anophelines of importance in malaria transmission is given, and certain terms used in the classification of degrees of malaria are defined.

The Report of the W.H.O. Expert Committee on Malaria, 1950 (p. 699), shows that the Committee endorsed the findings of the Conference [above]. Although residual insecticides are so successful, control by other means such as drainage or filling should be used in some situations. The Committee discussed transport of anophelines in aircraft, the use of the modern drugs in treatment and suppression, the despatch of demonstration teams to under-developed areas, and the provision of courses in malariology.

In an article commenting on the recommendations of the Conference, SWELLENGREBEL (p. 781) reiterates the view that protection against the ill effects of malaria can be achieved in the state of full premunition. Interference with the natural process of premunition should be attempted only if at the same time a profound study is made of the results in a practical test of control. In comment Macdonald makes the point that, in one area where full premunition has been claimed, the people are by no means in a satisfactory state of health, and that the Conference recommended attempts at control without waiting for a test.

MAEGRAITH (p. 14) discusses the wisdom of control of malaria in populations who might be susceptible to reinfection from surrounding hyperendemic areas, and also the question of population pressure which might follow successful control. It is necessary to ensure that eradication will not bring worse evils than malaria in its train.

An account of the history of the malaria service of Indonesia has been written by SWELLENGREBEL (p. 229).

In a report of the Malaria Division of Trinidad and Tobago (p. 8) it is shown that there has been a considerable reduction in death rates from malaria, and in infant mortality rates, since the inception of this Division in 1943. Drainage and the use of oil and DDT are the control methods used. The commonest vector is *A. aquasalis*, but this mosquito is easily deflected to animals, and is a poor vector under the existing conditions. There is some transmission by anophelines which breed in bromeliads, but these are controlled by copper sulphate solution sprayed from aircraft.

AZIZ (p. 17) reports on the *Anopheles* eradication programme in Cyprus during 1949. A very few adults and larvae were found, mainly *A. superpictus* ; *A. sacharovi* was not found.

EICHLER and PAGAST (p. 15) discuss methods of assessing the effectiveness of control of *A. maculipennis messeae.*

In a detailed paper PINOTTI (p. 1082) discusses the distribution and habits of the chief vectors of malaria in Brazil, in relation to the measures which have been taken for control.

Residual Insecticides

The use of residual insecticides in the control of malaria continues to expand. PAMPANA (p. 782) has published a long and detailed résumé of the results achieved, in which he analyses reports from most parts of the world, and SIMMONS and UPHOLT (p. 782) sum up 104 papers published on the control of various diseases by means of insecticides.

In Spain DE SANDE (p. 787) used BHC, and LOZANO MORALES and JUÁREZ JUÁREZ (p. 787) used BHC and DDT, and all report reduction in the numbers of vector anophelines, and in malaria. The insecticides were sprayed twice each year.

In Italy MISSIROLI (p. 16) found that the results of anti-malarial work were the same with residual spray whether anti-larval measures and drug prophylaxis were used or not, and reliance was therefore placed on spraying with DDT and Octa-chlor, with great benefit. SABATINI (p. 1071) writes in a similar optimistic strain about the results obtained in the Agro Romano with DDT and chlordan. These results were never equalled before the war by reclamation and larvicidal methods. CIUCA (p. 441) in Rumania is similarly impressed.

OLIVIER (p. 326) describes the steps taken to control malaria in Northern Transvaal, where a large and fertile area is being protected by larval and adult control. This area is at about the southern limit of *A. gambiae* and *A. funestus.*

A campaign has been carried out in S. Rhodesia (BHC and DDT) in which BLAIR (p. 1073) has noted indications of reduction of malaria, though assessment by morbidity and mortality statistics was not possible. Another successful effort has been in progress in Mauritius (DOWLING, p. 327), and in Madagascar DDT, Octa-chlor and BHC have been used on a large scale, together with administration of prophylactic drugs at weekly intervals (BERNARD, p. 444).

An extensive account of malaria eradication schemes which have been started, and carried out to a considerable extent, in U.S.A., Venezuela, British Guiana and Brazil, is contained in a symposium reported in the *J. National Malaria Society* (p. 1078). The remarkable results achieved so far are discussed, and the point is made that although these countries had anti-larval schemes before the days of DDT, they have now been abandoned, except in relation to bromeliads. The original summary should be read in full. Comparisons have been made between DDT and BHC. WILKINSON (p. 1074)

repeated the work of MUIRHEAD-THOMSON, who found that DDT was not nearly so effective as BHC against *A. gambiae* in East Africa. Wilkinson agrees that BHC was the more effective at the doses used, but the difference between the two insecticides was much less than Muirhead-Thomson found, perhaps because the latter used an unsatisfactory preparation (HOCKING, *ibid.*). There seems to be some repellent effect, particularly with BHC.

BERTRAM (p. 328) claims that DDT has an excitatory effect on *A. minimus*, and that BHC has not, but in comment Tredre refers to figures quoted by MACDONALD (p. 17) which show that in the same country (Assam) GILROY obtained results which do not support the view that there is much difference between these insecticides. More work should be done before DDT is rejected on this account. In Malaya, WALLACE (p. 525) has observed an irritant effect of DDT, but not of BHC, on *A. maculatus*.

In laboratory tests with *A. vagus* and *A. maculatus*, REID (p. 867) found that BHC killed all mosquitoes when freshly applied to the experimental surface, but only 30 per cent. 7 weeks later. DDT was not so effective at first but persisted longer ; chlordane was effective but soon lost its activity. BHC had some lethal and repellent action at a distance, and WHARTON (p. 1077) also refers to this. He concludes that *A. maculatus* is susceptible to deposits of both, but in every respect except persistence gamma BHC at 40 mgm. per sq. ft. is better than DDT at five times that dose. WHARTON (p. 1076) shows graphically the mortality rates for *A. maculatus* in Malayan houses after treatments with DDT and BHC.

In Mexico (with *A. pseudopunctipennis*) DOWNS and BORDAS (p. 1082) found that both DDT and BHC had some repellent effect, and that DDT irritated more than BHC and did not kill as many mosquitoes, though it persisted longer. It seems likely that BHC will prove at least as effective as DDT in reducing malaria.

SCHIAVI and PROENÇA (p. 333) have devised a method for detecting traces of DDT on wall surfaces.

The widespread use of DDT alone as a residual spray continues, with more emphasis on wettable powder preparations. Favourable reports have been made by the following authors :—

MECHALI (p. 444) in Morocco, reduction of malaria.

LIPPARONI (p. 866) in Italian Somaliland, reduction in density of anophelines, but not so much as in a village where anti-larval measures were also taken.

DOWLING (p. 327) in Mauritius, great reduction of malaria and of infant and general death rates. *A. funestus* are greatly reduced, but *A. gambiae* less so ; DDT probably repels *A. gambiae* to some extent.

MASTBAUM (p. 1073) in Swaziland, reduction in *A. gambiae* and in parasite rates (though Macdonald comments that the information is insufficient to allow assessment of the significance of the differences observed).

RAO (p. 1075) in Afghanistan, reduction in anophelines and malaria.

SRIVASTAVA (p. 1075) in the hyperendemic Tarai area of India, reduction of malaria especially in association with suppressive proguanil (300 mgm. once each week for adults).

VEDAMANIKKAM (p. 128) in India, reduction in *A. fluviatilis*.

SUBRAMANIAN *et al.* (p. 126) in India, annual cost 7·4 annas per person.

VISWANATHAN and RAO (p. 127) in India, annual cost 6 annas ; reduction in malaria and general death rate.

Bonne-Wepster and Swellengrebel (p. 128) in Java, effective against *A. sundaicus* and *A. subpictus*.

Bradley and Lyman (p. 19) in south-eastern U.S.A.

Ludvik *et al.* (p. 616) in U.S.A., no evidence of increase of resistance in *A. quadrimaculatus*. DDT has some irritant action.

Ludvik (p. 236) in U.S.A., DDT used as a barrier spray on vegetation.

Downs *et al.* (p. 333) in Mexico, marked reduction in *A. pseudopunctipennis*.

Floch (p. 617) in French Guiana, satisfactory against *A. darlingi*.

Montalván C. (p. 867) in Ecuador.

Deane *et al.* (p. 19) in Brazil, notable decline in spleen and parasite rates.

Galvão and Damasceno (p. 19) in Brazil. High lethal action against *A. darlingi* for 4 months, declining to zero at 8 months.

da Costa and Bassères (p. 19) in Brazil ; they prefer aqueous suspensions.

Some warnings against over-optimism have been issued :—

Rao (p. 126) makes the point that the advent of DDT has not eliminated the need for research.

Rajendram *et al.* (p. 17) show that *A. culicifacies* breeds up to several miles from human habitations in Ceylon, and complete eradication by DDT residual spray is probably impracticable.

MacGregor (p. 128) reports disappointing results against *A. maculatus* in Malaya ; many estates still rely on oiling or suppressive drugs, or both, but many use DDT as well.

Nair (p. 331) shows that in Malaya *A. letifer* rests and occasionally feeds out of doors, and this reduces the (undoubted) value of DDT spray.

Smith and Dy (p. 18) in the Philippines think that DDT spray cannot control malaria because *A. minimus flavirostris* often does not remain in houses long enough to pick up a lethal dose, and the local building materials do not retain DDT well.

de Bustamante *et al.* (p. 617) in Brazil show that in an area where houses have been sprayed for 3 years there is no evidence of decrease in either the total population of anophelines or of *A. aquasalis*, though they were scarce in the houses.

Larvicidal Methods

Although in the Tennessee Valley the control of *A. quadrimaculatus* is mainly achieved by managing the water levels of the great reservoirs in such a way as to reduce the amount of vegetation in the water close to the shore, it becomes necessary at times—for instance after storms—to use larvicides sprayed from aircraft. Krusé *et al.* (p. 615) describe their experiments on the best techniques for this purpose with DDT, and discuss the relative merits of sprays and aerosols. A study has been made of the additional benefits, in agriculture, forestry etc., which have followed the malaria control measures taken in connexion with the large Kentucky reservoir of the Tennessee Valley Authority (Gartrell and Johnson, p. 129). These are substantial.

Tests of the ability of larvae and pupae of *A. maculipennis* to survive drying led Jettmar (p. 432) to conclude that intermittent drainage of rice fields is a valuable method of mosquito control.

A simplified siphon has been designed by Ejercito (p. 15).

For the control of malaria in Morocco MECHALI (p. 1072) makes it clear that anti-larval measures form the chief protection in many large centres of population, but that anti-adult measures and suppressive medication are relied upon in scattered areas. Epidemics occur from time to time and require energetic treatment.

A note on malaria control during the past 30 years at an oasis in the Algerian Sahara is contributed by BÉRÉNI (p. 510).

REID and BIN OMAR (p. 332) show that DDT in oil is effective as a larvicide against *A. maculatus* in flowing water only if the drains are kept free from weeds, which is laborious work.

BERTRAM (p. 331) shows that DDT and BHC can successfully be used in flowing water for the control of *A. minimus*.

RACHOU and DE MELLO (p. 524) have used DDT powder from aircraft against larvae of *A. aquasalis* in Brazil ; results were poor.

BHC is used as a larvicide, and WASICKY *et al.* (p. 20) have found it effective at 1 in 100 million, and less toxic than DDT to fish and other aquatic organisms. BYRNE (p. 332) confirms its value and cheapness, and KEYS (p. 788) writes in the same strain, but points out that it has no action on anopheline eggs and pupae. BHC must be applied regularly and fairly frequently.

For clearing the bromeliads in which *Kerteszia* breed in Brazil, RACHOU *et al.* (p. 618) found that spraying with 1 per cent. copper sulphate was more efficient, though rather more expensive, than manual removal of these plants, except in difficult country.

Plasmodia of Monkey Malaria

MULLIGAN *et al.* (p. 21) inoculated tissues from various organs of monkeys infected with *P. cynomolgi*, into clean monkeys. The tissues were taken later than 45 minutes after infection, but earlier than 9 days, and in no case did they provoke infection, though it seems most probable that the liver tissues contained pre-erythrocytic forms. In this respect, therefore, there is a difference between this monkey malaria and bird malaria, which gave positive results in similar experiments.

By giving sub-curative doses, HAWKING and THURSTON (p. 868) have rendered a strain of *P. cynomolgi* resistant to proguanil. Resistance of pre-erythrocytic forms and of gametocytes was observed.

JASWANT SINGH *et al.* (p. 20) report successful transmission of *P. knowlesi* by injection of infected glands of *A. stephensi* and *A. annularis*.

Phenylhydrazine produces anaemia in monkeys, and RIGDON *et al.* (p. 714) show that it probably has a direct action on *P. knowlesi* and an indirect action through its effect on the red cells, which interferes with the oxygen consumption of the parasite. Infected monkeys were successfully treated with this substance, and acquired immunity against reinfection, but its duration was not determined.

JASWANT SINGH *et al.* (p. 334) have tested various drugs as suppressants of *P. knowlesi* ; the best results were obtained with chloroquine and camoquin.

Plasmodium berghei, etc.

Much work has been done on *P. berghei*. The natural vector is *Anopheles dureni*, which is difficult to breed in captivity ; RODHAIN and VINCKE (p. 871) have therefore attempted to infect *A. maculipennis atroparvus*, with a slight indication of success.

Work on *P. berghei* has hitherto been done by inoculation of infected blood. VINCKE and LIPS (p. 714) now report their experiments on the infection of rats and mice by injection of sporozoites in infected glands or thoraces of *A. dureni* (a vector in nature). This work has shown that although white

mice were readily infected by inoculation of blood of infected animals, sporozoite infection was difficult or impossible. Rats, on the other hand, were easily infected in this way, and showed incubation periods of 3–8 days. In comment, Garnham concludes that the pre-erythrocytic cycle is probably more like that of birds (in mesodermal cells) than that of mammals (in liver cells). White rats are evidently better animals than white mice for passage work, partly because gametocytes are so prone to disappear in serial passage in mice.

Corradetti (p. 619) shows that blood-induced infection of *P. berghei* in rats does not produce relapses, but lasts only up to 50 days after the end of the primary attack. It does, however, produce acquired immunity which the author thinks is distinct from premunition and which protects against homologous reinfection for at least 205 days after the primary attack. This immunity is much less in splenectomized rats, though still feebly present as a result of the activity of the reticulo-endothelial elements in other organs, and it is therefore evident that it depends largely on the spleen.

The infectivity of *P. berghei* for animals has been studied by various authors, who have found the following susceptible to it : golden hamster and field vole (Adler *et al.*, p. 21), golden hamster (Durand and Mathis, p. 715), gerbil (Sergent and Poncet, p. 445), bat (van Riel, p. 618), squirrel (Ramakrishnan and Prakash, p. 618).

The course of infection in white mice and white rats has been studied by several authors. Galliard and Lapierre (pp. 129, 869) show that the younger the rat the more severe the disease. Splenectomy after apparent cure provokes relapse. They made some attempt to immunize rats against this parasite. Pathology is described by Levaditi and Vaisman (p. 445), and the course of the infection by Raffaele and Baldi (p. 788), and by Baldi (p. 789). Attempts to infect certain culicine mosquitoes were unsuccessful. Rodhain (p. 870) shows that although the infection in cotton rats is usually benign, splenectomy renders it severe ; the spleen evidently plays an important part in defence.

Earlier findings by other workers indicated that p-aminobenzoic acid did not inhibit the action of proguanil on *P. gallinaceum*, but Thurston (p. 21) has now found that it does inhibit its action on *P. berghei*.

Morphological changes in *P. berghei* resulting from treatment with doses slightly above the minimum effective doses of certain drugs are described by Thurston (p. 869), and similar work on *P. cynomolgi* is recorded by McFadzean (p. 869).

Hill (p. 130) has examined the schizonticidal action of various drugs on *P. berghei* and two avian malaria parasites.

Mudrow-Reichenow (p. 871) shows that *P. berghei* responds to treatment with sulphonamides and aureomycin, and to mepacrine, chloroquine, sontochin and camoquin, but only poorly to quinine, proguanil, pamaquin, pentaquine and isopentaquine. The value of blood-induced infections with *P. berghei* for screening anti-malarial drugs is therefore doubtful.

Field and Edeson (p. 337) describe a malaria parasite of the Malayan squirrel.

Hoogstraal *et al.* (p. 446) describe the parasite found in the East African elephant shrew, which is probably identical with the parasite named *P. brodeni* by Rodhain *et al.*

Goodwin (p. 716) has observed the course of infection with *P. floridense* in a colony of lizards.

Plasmodia of Bird Malaria

HUFF (p. 525) records observations on pre-erythrocytic forms of certain avian malaria parasites in various birds ; the original should be consulted for details.

DUBIN *et al.* (p. 334) have been able to cultivate normal chicken macrophages and to keep pre-erythrocytic forms of *P. gallinaceum* alive and multiplying for about 7 days. They describe the technique. The same authors (p. 335) show that these cultivated forms are infective to chicks, though the infection they provoked was milder than infection induced naturally. Some evidence of multiplication was obtained by MANWELL and BRODY (p. 335) who cultivated various bird malaria parasites in the Harvard medium. TAYLOR *et al.* (p. 873) have succeeded in keeping the erythrocytic forms of *P. gallinaceum* alive in culture, by a rocking technique, for 24 hours. Segmentation did not occur. By this technique they (p. 873) investigated the action of certain 8-amino-quinolines, and showed that the actions of some of these drugs (pamaquin and pentaquine) *in vitro* were not correlated with their actions *in vivo*, which suggests that they act through the formation of metabolites [see JOSEPHSON *et al.*, above]. Others, however, were active in both types of experiment.

Differences were observed by GREENBERG *et al.* (p. 620) in the behaviour of two strains of *P. gallinaceum*, of common origin. One had previously been maintained by blood passages and the other by sporozoite infection through mosquitoes. It seems that one was probably an aberrant variant which had arisen by mutation.

The production at will of abnormal forms of *P. gallinaceum* containing large, round clear areas, was effected by WILCOX *et al.* (p. 131) by following certain procedures, which are detailed.

In work on *P. gallinaceum*, MEYER (p. 22) concludes that infected blood can cause infection of the brain of chick embryos only if it contains exo-erythrocytic forms.

GROMAN (p. 874) has published a study of the changes which take place in certain nitrogenous constituents of chicken erythrocytes during the cycle of development of *P. gallinaceum*, and the relationship of these changes to oxidative processes.

AKINS (p. 22) has devised a method for infecting *Aëdes aegypti* with *P. gallinaceum* from chick embryos.

EYLES (p. 237) describes a method for staining oöcysts of *P. gallinaceum* in *Aëdes aegypti*.

BISHOP and MCCONNACHIE (p. 1085) have previously shown that in chicks infected with *P. gallinaceum*, sulphadiazine produces resistance to itself and to proguanil. They now show that both these actions are antagonized by PABA. MCCONNACHIE (p. 1085) has been unable to produce resistance in *P. gallinaceum* or *P. relictum* by prolonged treatment of latent infections with sulphadiazine or proguanil, though it can readily be done by treating acute infections.

High activity on blood-induced infections with *P. gallinaceum* and *P. berghei* was shown by certain 2 : 4-diaminopyrimidines by FALCO *et al.* (p. 872) who report tests on a large series. GREENBERG and RICHESON (p. 950) show that a strain of *P. gallinaceum*, resistant to proguanil, was not resistant to a pyrimidine compound which has some resemblance in biological action to proguanil. The pyrimidines do not readily give rise to resistant forms and are active against this parasite ; they may prove important in human malaria. ROLLO (p. 1086) shows that a pyrimidine derivative which is active against *P. gallinaceum* and *P. berghei* retains its activity against strains made resistant to sulphadiazine and proguanil. It does not itself readily provoke resistance.

Terzian (p. 447) discusses the action of sulphonamides and PABA on susceptibility of *Aëdes aegypti* to *P. gallinaceum*.

Hunninen *et al.* (p. 336) have found that *A. quadrimaculatus* can become infected with *P. relictum* from sparrows. If this takes place in nature, it has a bearing on the results of mosquito dissections. Mok (p. 874) has proved that *P. relictum* can be transmitted by *A. freeborni*.

Increase in erythrocyte sedimentation rate in pigeons infected with *P. relictum* is ascribed by Redmond *et al.* (p. 715) to loss in cell volume brought about by destruction of erythrocytes.

Grant (p. 237) has rendered *P. relictum* resistant to proguanil in pigeons treated by the usual method of giving sub-curative doses.

An account of *P. fallax* from the tufted guinea-fowl of Uganda is given by Huff *et al.* (p. 446).

McGhee (p. 619) has succeeded, with some difficulty, in adapting *P. lophurae* from chick embryos to infant mice. Gametocytes were never seen in the mice, but appeared normally on passage back into chick embryos. The strain is now maintained in 4-day mice, with no apparent diminution in viability.

Trager (p. 130) has succeeded in making extracellular cultures of *P. lophurae* in a medium containing a concentrated extract of duck erythrocytes ; the parasites survived for 2 days and developed to produce schizonts.

Ben-Harel (p. 526) shows that serum from hyperimmunized or from naturally resistant ducks contains opsonins which govern the phagocytic power of macrophages against *P. lophurae* in tissue culture.

Becker (p. 22) investigated the response of ducklings infected with *P. lophurae* to injections of plasma from ducks which had recovered from that infection. The results were not clear-cut, but Becker and Schwink (p. 527), working with plasma from chicks which had recovered from *P. lophurae* infection, injected into ducklings and followed by injection of parasitized cells from infected chicks, found that the plasma at first exerted a sparing action on the infected chick cells, but later gave protection against the infection. Becker and his colleagues (p. 1084) have been able to separate the " sparing factor " of plasma of ducks which have recovered from *P. lophurae* infection, from the factor in which passive immunity resides. They (p. 1085) have investigated this sparing action and conclude that it is not due to the formation of excess haemagglutinin with resulting formation of clumps of red cells insusceptible to phagocytosis.

Trager *et al.* (p. 790) have shown that fresh plasma from uninfected ducks would agglutinate erythrocyte-free suspensions of *P. lophurae*, but that these agglutinins were heat-labile. In infected ducks heat-stable agglutinins developed to much higher titre. *Charles Wilcocks*

MALARIA

British Med. Bull. 1951, v. 8, No. 1, 1–70. **Recent Research in Malaria.**

This symposium is made up of a series of articles by 12 contributors, each an authority on the particular aspect of the subject assigned to him. In an introductory chapter Sir Philip Manson-Bahr traces the development of malaria research from the demonstration of malarial pigment by Meckel in 1847 to the establishment of the mosquito transmission of the disease by Ross under Manson's inspiration and its confirmation by Grassi and his colleagues at the beginning of the present century, and from thence onwards to the present day.

Consideration is given to the relative importance of the various advances made and to the stimulus afforded to malaria research by the intensive study of other mosquito-borne diseases.

H. E. SHORTT gives an account of the life-cycle of the mammalian malaria parasite, on which so much light has been shed by the classical investigations carried out by himself and P.C.C. GARNHAM at the London School of Hygiene and Tropical Medicine. A chapter by the latter describing the various patterns of exo-erythrocytic schizogony is of particular interest. Nine different types are described, illustrated by a series of excellent charts. The author is to be congratulated on his extremely lucid exposition of a subject which to the uninitiated appears at first sight alarmingly complex.

F. HAWKING describes the technique devised by him for the cultivation of exo-erythrocytic forms of avian plasmodia of tissue cultures in chicken cells of the macrophage reticulo-endothelial type. These tissue cultures have been of use not only for the study of the morphology of the parasites at different stages of development, but also for investigations in the field of chemotherapy, where important studies have been made on the mode of action of anti-malarial drugs.

The metabolism of malaria parasites is discussed by J. D. FULTON, who was associated with Sir Rickard Christophers in a series of pioneer studies on the respiration of *Plasmodium knowlesi* in 1938. During the second world war numerous researches on the biochemistry of erythrocytic stages of malaria parasites were undertaken, in which simian and avian parasites were chiefly made use of. A few investigations have also been carried out with human plasmodia, but the numbers present in human blood are generally too small for experimental purposes. Many of the investigations described were undertaken with the object of finding some vulnerable link in the metabolic chain and in the growth requirements of malaria parasites which would provide a clue to the synthesis of more effective anti-malarial compounds. In the course of these studies a number of fundamental facts regarding the biochemistry of these organisms have been established.

In a chapter devoted to a consideration of the physiological approach to the problems of malaria B. G. MAEGRAITH points out that most of the basic disturbances of the host's physiological make-up that develop during the disease are not specific, but are similar to those encountered in other physiological states. Little is known as to the direct effects of the plasmodial invasion of erythrocytes. The most obvious of the general physiological processes involved are anoxaemia, anaemia and tissue anoxia. There are also certain important changes in the local and general circulation of the blood. From the clinician's point of view, the most important conclusion reached is that so many of the lesions, for example those in the brain and kidney, are fundamentally reversible in their early stages.

The community aspects of immunity to malaria are discussed by G. MACDONALD. The view has been advanced that in some cases the existence of group immunity may make control measures unnecessary or even undesirable. It is pointed out, however, that while field studies have shown that community survival is possible, they have not demonstrated a complete or satisfactory freedom from ill-effects on the group as a whole. When a community is first exposed to malaria, a very high proportion of the population becomes infective. Resistance to gametocyte production may develop within 2 years, so that where conditions are static the community may revert within 3 years to the endemic status. But if, as is commonly the case in colonization schemes, immigrants continue to arrive from other areas, the epidemic condition may persist almost indefinitely, new arrivals nullifying the efforts of the existing group to accommodate itself. Attempts to assess the cost of acquisition of

tolerance are hampered by the fact that severe malaria so often occurs in backward areas where reliable statistics are seldom available. The only valid criterion is gross mortality, and the changes in it which follow the imposition of control measures in known highly malarious places. Instances are quoted where a mortality reduction of some 40 per cent. has been effected by such means, and the author contends that unless some essential difference is demonstrated between happenings in these places and elsewhere, it should be assumed that these reductions represent the typical cost of acquiring a firm group tolerance to heavy malarial infection.

D. G. DAVEY, in a chapter on the chemotherapy of malaria, gives a lucid account of the development of synthetic anti-malarial drugs. A series of notable researches by German workers, starting from certain derivatives of methylene blue, led to the evolution first of pamaquin, later of atebrin [mepacrine] and finally of chloroquine and sontochin. This work was undertaken with reference to action on blood forms of the parasite only, the fact that pamaquin acts on exo-erythrocytic forms being fortuitous to the main line of German research. The researches by British investigators, undertaken at a later stage, which led to the production of proguanil, proceeded on different lines, tests against exo-erythrocytic forms of avian parasites running parallel throughout with those against blood forms. An account is given of the mode of action of anti-malarial drugs in relation to the various stages in the life-cycle of the parasite, of their pharmacology and toxicity, and indications are outlined for their use under different conditions both for prophylaxis and for treatment of the clinical attack.

The problem of drug resistance to malaria is discussed by Ann BISHOP. Resistance to proguanil has been produced in *Plasmodium gallinaceum*, *P. cynomolgi*, *P. vivax* and *P. falciparum* under experimental conditions, while reports from Malaya and Indonesia suggest that proguanil-resistant strains of *P. falciparum* are developing in the field in these areas. Attempts to produce proguanil resistance in latent infections have hitherto failed, and it follows that in human malaria such resistance is more likely to arise during mass treatment of acute infections than when the drug is used to prevent a recurrence of the acute attack in persons whose infection is latent. Proguanil-resistant strains of *P. cynomolgi* have shown normal sensitivity to chloroquine, mepacrine and pentaquine, the inference being that in human malaria such drugs would be effective in suppressing any proguanil-resistant strains that might develop. Attempts to produce resistance to chloroquine have so far failed.

In his introductory chapter Sir Philip Manson-Bahr expressed the view that the greatest single factor in the advancement of malaria research during the past 30 years has been the introduction of therapeutic malaria. This is largely substantiated in the following two chapters in the symposium, the first by G. COVELL and W. D. NICOL on the clinical, chemotherapeutic and immunological aspects of induced malaria and the second by P. G. SHUTE on mosquito infection. It has been possible for the first time to study in detail the natural course of the disease in non-immune subjects, and ample clinical material has become available for research in chemotherapy, parasitology, pathology and immunology. Advances have been made also in the study of mosquito ecology and of the malaria-carrying capacity of different species of mosquitoes. A number of strains of all four species of human malaria parasite have been investigated at the Horton Malaria Therapy Centre during the past 26 years, and it was here that *Plasmodium ovale* was finally proved to be a valid species. Wide variations have been shown to exist in the response of different strains of parasite to particular drugs, and in the capability of different species of mosquitoes to act as vectors of malaria parasites. The earliest trials of pamaquin and mepacrine in human subjects were carried out at Horton. The importation of an Indian mosquito, *Anopheles stephensi*, has made it possible to study a

West African strain of *P. falciparum*, which had proved refractory to European mosquitoes, and to investigate the value of proguanil in the prophylaxis and treatment of this form of malaria. More recently, quartan malaria has been successfully transmitted by the same anopheline, and by this means detailed clinical and parasitological studies of the naturally induced disease in non-immune subjects have been made possible. Much of the knowledge gained from the study of induced malaria has been applied to epidemiological problems arising under field conditions in various malarious countries.

The final chapter in the symposium, by C. B. SYMES, is devoted to the subject of malaria control by insecticidal measures. Prior to 1932 anti-mosquito measures were for the most part restricted to the destruction of aquatic stages of the insect by drainage or by the application of larvicides such as oil or paris green. The success achieved in rural areas in South Africa and subsequently in India by spraying the interior of dwellings with pyrethrum emphasized the importance of attacking the adult mosquito, and since the introduction of residual insecticides such as DDT and BHC during the second world war, this has become the chief and sometimes the sole measure employed in modern large-scale anti-malaria campaigns. At first kerosene solutions were exclusively used, but it has transpired that on absorbent surfaces such as dried mud, which is so widely used for house construction in many countries, very serious losses of the insecticides occur through absorption. The majority of health authorities now use wettable powder suspensions for large-scale work, supplemented by solutions in white kerosene for better-class houses where the greyish deposit of the suspension is an objection. Attention has been directed not only to the development of suitable formulations of the various insecticides, but also to the production of the most suitable equipment for their application under different field conditions.

A somewhat disturbing feature which has come to light recently has been the development of resistance or tolerance in house-flies and in certain species of culicine mosquitoes to several of the chlorinated hydrocarbon insecticides. A similar resistance has not yet been recorded in anopheline mosquitoes, but there is always the possibility that it may eventually arise. Close watch is being kept for any indication of such a contingency, so that appropriate steps may be taken to deal with it.

It is estimated that the application of residual insecticides has already brought some measure of protection to some 70 or 80 million people. The aim of present research is to make such protection more complete by improvements in technique and to extend it eventually to the several hundreds of millions, mostly in rural areas, who are still exposed to malarial infection. *G. Covell*

MACARTHUR, W. P. **A Brief Story of English Malaria.** *Brit. Med. Bull.* 1951, v. 8, No. 1, 76–9.

For centuries malaria was firmly established in certain endemic centres in England, particularly the Fen country, the marshes of the Thames Estuary and south-east Kent, the low-lying country around Bridgwater in Somerset and the Ribble district of Lancashire. In London itself the Lambeth and Westminster marshes were notorious in this respect. From its permanent foci, the disease spread from time to time in epidemic form during very warm summers. For example, SYDENHAM describes "intermittent fever" as being particularly prevalent during the years 1661 to 1664. Of all patients treated at St. Thomas's Hospital during the decade 1850–60, one in twenty was suffering from ague, and in bad years this figure was much exceeded. At least 30 per cent. of the patients

treated at Gravesend hospital about this date were malaria cases, and as late as 1870 the garrison of Tilbury fort was changed every 6 months, because of the prevalence of ague in the neighbourhood.

The most prevalent form of the disease was benign tertian, but quartan was also present, though to a less extent. The most striking of Sydenham's observations is his lucid description of the continued fever which commonly ushers in intermittent fevers, and his insistence that the latter were really from the first tertians or quartans, a conclusion which was disputed for the next 250 or so years before its truth was finally established.

Malaria in England never took rank as one of the great killing diseases, although it was responsible for many deaths, especially among the old and weakly. James I and Oliver Cromwell are said to have died of it, and James's daughter Elizabeth is reported to have experienced 30 paroxysms of the disease in succession. Milton, Nelson and Sir Walter Ralegh were other distinguished sufferers.

The decline of English malaria was brought about by the combined effect of a number of different circumstances, such as the drainage and reclamation of swampy land, changes in methods of farming and land cultivation, improvements in house construction and the replacement of cinchona bark by the more effective quinine followed by a fall in the price of the latter. All these influences and possibly others working together brought about a state of affairs where the number of new human infections failed to keep pace with the number of cures, and the chance that a mosquito might become infected and have the opportunity of passing on the infection became more and more remote. The resulting recession of the disease extended over a prolonged period, becoming especially noticeable from about 1800 onwards. After 1860 the decline became much accelerated " and it was steadily routed out of its ancient strongholds, so that to-day the old English brand of malaria appears to be wholly extinct ".

G. Covell

Haas, W. & Haas, Brigitte. Epidemiologische Probleme um die Malaria in Leipzig von 1945–1949. [**Epidemiological Aspects of Malaria in Leipzig between 1945–1949**] *Zent. f. Bakt.* I. Abt. Orig. 1951, June 16, v. 156, No. 7, 537–42. [12 refs.]

Belios, G. D. [**Course of Malaria in Greece during Recent Years evaluated on Basis of 1949 Reported Malaria Deaths in Towns, and other Available Epidemiological Data**] *Arch. Hyg.* Athens. 1950, Apr.–June, v. 1, Nos. 4/6, 191–206, 2 charts (1 folding). [25 refs.] [In Greek.] English summary.

This paper, written in Greek and containing 4 detailed tables and 2 charts, records work intended to evaluate the malaria situation in Greece as it resulted from the 4-year malaria control problem. The author analyses the malaria death rate in urban centres in 1949 in relation to other epidemiological information, such as malaria indices.

In a short English summary he notes that the specific malaria mortality in towns in 1949 was estimated to be no more than 1 per 100,000. This was found to be about 1/35 of that for the 9-year period 1930–38 when control measures were few or lacking. It is added that when this ratio is compared with that derived from analysis of corresponding parasite indices it is found " to substantially underestimate the noted decline of the disease ".

Malaria incidence in urban centres does not seem to have been more than 1/100 of its pre-war rate, *i.e.*, about 10,000 cases yearly in 1948–1949, compared with

a mean annual rate of 1 million cases before the war. It is also concluded that " practically the annual total of the 4,500 victims of this disease escaped death during the 1948–1949 period ". *H. J. O'D. Burke-Gaffney*

SHIBATA, S. **Statistic Investigation of the Splenic Tumor in Malaria.** Reprinted from *Jahrber. des Kurashiki-Zentralhospitals.* 1950, v. 21, No. 2, 89–108, 3 figs.

The factors governing the size of the enlarged spleen have long been the subject of enquiry and speculation. CHRISTOPHERS put forward a *splen* theory summarized in 1927 (*Transactions of the Far Eastern Association of Tropical Medicine, Seventh Congress,* India, 1927, Vol. II). It said that a single untreated malarial infection caused a certain enlargement of the spleen which was thus a kind of unit called a splen. A superposed infection increased this enlargement by a similar unit. If this were so the random distribution of suppressed infections would result in a binomial distribution of the various sizes of enlarged spleens which would be related to the spleen rate. The author of the present paper, though apparently unaware of this background, has studied the subject independently, and by mathematical analysis of the frequency of different-sized spleens in association with different spleen rates, has arrived at the conclusion that they follow a Poisson distribution, which is the appropriate variant of the binomial distribution suggested by Christophers. The figures given refer to many series of observations in the Celebes and China and substantially support the observation. *G. Macdonald*

SHUTE, P. G. & MARYON, M. **Studies in the Transmission of *Plasmodium malariae* by *Anopheles* Mosquitoes.** *Parasitology.* 1951, Dec., v. 41, Nos. 3/4, 292–300, 1 fig. [15 refs.]

The sporogony of a West African strain of *Plasmodium malariae* was studied in *Anopheles stephensi.* Mosquito infections were difficult to obtain, uncertain to predict and never of a density comparable with those of *P. vivax* or *P. falciparum.* Gametocytes of *P. malariae* are not always easy to recognize, and repeated attempts at mosquito feeding revealed the curious phenomenon that the appearance and quantity of gametocytes in the blood bore little relationship to the infection in the mosquito. Thus male and female gametocytes might be numerous in the blood and yet the mosquitoes developed no oöcysts ; on the contrary, no males might be detectable even after a prolonged search, but the anophelines became infected. The authors emphasize that with *P. malariae* in particular, the " quality " of the gametocytes rather than their quantity is the important factor.

After infection, the mosquitoes were usually kept at 78°F. Twelve out of 68 batches became infected, with a maximum of 9 oöcysts per mosquito, and 58 per cent. positive in a single batch. The number of mosquitoes usually found infected was much lower than this—about 5 per cent.—with only one or two oöcysts present on each mid-gut. The length of the mosquito cycle was thought to be about 21 days ; the minimum incubation period in a recipient was 16 days—but the authors point out that the length of the true pre-patent period corresponding to pre-erythrocytic schizogony may be even less than this [the reviewer showed it to be 12 days in the case of the quartan parasite of monkeys—*P. inui* (see this *Bulletin,* 1952, v. 49, 236)]. Two consecutive transmission experiments (*A. stephensi*-man-*A. stephensi*-man) were successfully carried out, though it is interesting to note that there was apparently no heightened gametocyte production after insect transmission.

The oöcyst of *P. malariae* is described and illustrated. The pigment between the third and sixth days is in irregular granules, 30 or more in number, scattered throughout the cyst ; later it becomes concentrated in clumps on the periphery. The sporozoites are longer and broader than those of *P. vivax* or *P. falciparum*—measuring 14 μ instead of 11 or 12 ; they are said to contain a larger quantity of chromatin. These differential characters possessed by oöcyst and sporozoite may prove useful in field studies. *P. C. C. Garnham*

Thomas, T. C. E. **Biting Activity of *Anopheles gambiae*.** [Correspondence.] *Brit. Med. J.* 1951, Dec. 8, 1402.

Observations were made in huts in Sierra Leone on the biting activities of *Anopheles gambiae*. The mosquitoes were collected at night while resting on the sleeping occupants. The results of 4 nights' collecting showed, in the case of a family of 6 and another one of 8 people, that adults were more attractive than the children. With families of 2 and 3 people the biting was more at random.

The author suggests that these preliminary observations, though by no means conclusive, indicate that *A. gambiae*, when selecting a blood meal, prefers the adult members of a large family, thus confirming the results obtained by Muirhead-Thomson with Caribbean anophelines [this *Bulletin*, 1951, v. 48, 704]. *H. S. Leeson*

Pringle, G. **The Identification of the Larvae of *Anopheles stephensi* Liston and *Anopheles superpictus* Grassi in Iraq.** *Bull. Entom. Res.* 1952, Jan., v. 42, Pt. 4, 779–83, 3 figs.

The identification of the larvae of these two anophelines is difficult because their chaetotaxy is so similar. The author considers suggestions made by other workers from several parts of the mosquitoes' range in the light of his own experiences in Iraq. He concludes that in Iraq the only feature of any value for the differentiation of these larvae is the proportionate length of the filament of the abdominal palmate hairs, particularly that on segment III. Filaments of this hair on the *stephensi* larvae were all less than one-third of the length of the leaflet ; on *superpictus* they were mostly over or about one-third.

It is suggested that 90 per cent. of the larvae of these species can be separated by this character. *H. S. Leeson*

Viswanathan, D. K., Ramachandra Rao, T., Halgeri, A. V. & Karandikar, V. S. **Observations on Anopheles Densities in Indoor Shelters during the Forenoon, Afternoon and Night.** *Indian J. Malariology.* 1950, Dec., v. 4, No. 4, 533–47, 1 chart.

Indoor collections of *Anopheline* mosquitoes were made in four villages in the Poona district, two of them sprayed with DDT, and two of them unsprayed. In each village there were 6 catching stations, sited in typical dwellings, which were searched between 7.00 and 11.00 hours and 6 others which were searched between 11.00 and 15.00 hours. Collections were made at weekly intervals. The afternoon collections generally yielded fewer mosquitoes than the morning collections, and there was a positive correlation between these two figures.

This correlation is demonstrated on a graph, and the regression formulae for the sprayed and unsprayed villages are calculated.

The average densities of females of the species *Anopheles culicifacies*, *A. fluviatilis* and *A. stephensi* var. *mysorensis* was 18·1 per man-hour (mornings) and 12·1 per man-hour (afternoons) in the unsprayed villages, and 6·4 per man-hour (mornings) and 4·8 per man-hour (afternoons) in the sprayed villages. From these figures the authors conclude that morning collections are sufficient as a check on the efficacy of insecticidal treatment.

Some night collections were made in villages in the Nira Canals Zone, when it was found that collections between 20.00 and 21.00 hours were double the size of morning collections in unsprayed and DDT-treated villages, but only 40 per cent. greater in villages sprayed with BHC. The authors do not feel that there is any evidence of the repellent effect of DDT, which was reported by MUIRHEAD-THOMSON [this *Bulletin*, 1950, v. 47, 439], in *Anopheles gambiae*.

A. J. P. Goodchild

WHARTON, R. H. **The Habits of Adult Mosquitoes in Malaya. I.—Observations on Anophelines in Window-Trap Huts and at Cattle-Sheds.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 141–54, 1 map. [17 refs.]

These experiments were carried out on a rubber estate near Tampin, Negri Sembilan, Malaya, where 10 species of *Anopheles* were present and where malaria control measures were restricted to the issue of suppressive proguanil [paludrine] and there was no check on the breeding of *Anopheles maculatus*.

Experimental huts fitted with window traps were used to study the habits of the adult anophelines ; men, calf, goats and dogs were used as baits. On two nights a month, mosquitoes were collected from cattle sheds. A man was also placed in an open, isolated room, another sat in the open and a third operated the human bait trap ; these 3 men occupied these places in rotation on successive nights.

A large proportion of *A. maculatus*, *A. philippinensis* and *A. hyrcanus* entered the huts after 9 p.m. but very few *A. vagus* entered the huts after 8 p.m. About 50 per cent. of the first three species caught in the window trap had entered it by midnight and 80 to 90 per cent. by 5 a.m., one hour before dawn. Most of the mosquitoes had left the huts before 8 a.m. and *A. vagus* was the only one to show any tendency to remain indoors. *A. maculatus* was the only species to attack man readily indoors though it preferred to feed in the open. Two men were found to be more attractive to the mosquitoes than one man. Of the animals, the calf was the most attractive to *A. maculatus*, *A. philippinensis*, *A. hyrcanus*, *A. vagus* and *A. aconitus* and one calf attracted about as many *A. maculatus* as two men. Anophelines did not enter empty huts even when they had fed elsewhere.

At the cattle sheds it was found that the vast majority of unfed mosquitoes were attracted to cattle. *A. vagus* and *A. hyrcanus* were found feeding between 7 and 8 p.m. but *A. philippinensis* and *A. maculatus* were not caught until after 9 p.m. When they had fed they returned to the grass outside the sheds and many of them were still there at dawn.

The experiments showed that the anophelines leave huts and cattle sheds shortly after feeding and therefore there is no prospect of achieving eradication of the malaria vector, *A. maculatus*, by house spraying with residual insecticides alone, though a reduction in the number of malaria cases may be looked for, because this mosquito seems to be particularly susceptible to deposits of DDT and BHC even though the period of contact must be relatively short. The experiments also show that cattle on an estate may divert many *A. maculatus* which would otherwise feed on man.

H. S. Leeson

WHARTON, R. H. **The Habits of Adult Mosquitoes in Malaya. II.—Observations on Culicines in Window-Trap Huts and at Cattle-Sheds.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 155–60. [11 refs.]

The main interest in these observations lies in the demonstration of the marked difference in behaviour and biting habits of *Culex fatigans* and the other culicine mosquitoes in the area, which is the same part of Malaya as that where the work on anophelines was done.

More than 170 species of culicine mosquitoes in 17 genera are known to occur in Malaya but few of them come into contact with man. Domestic species are restricted to *Culex fatigans*, *Aëdes aegypti*, *Aëdes albopictus* and *Armigeres obturbans*. Of these only the first two can be found in houses by day and *C. fatigans* is the only mosquito to remain indoors after biting.

In the experiments with the huts *C. fatigans* (83 per cent.) completely dominated the collection from the man-baited hut but *C. vishnui* and *C. gelidus* made up 85 per cent. of the catch in the calf-baited hut. When offered the choice of two animals, *C. fatigans* preferred human blood ; *C. vishnui*, *C. gelidus* and *C. sinensis* preferred cattle blood. *Mansonia uniformis* and *M. longipalpis*, the vectors of filariasis, preferred cattle blood, which was surprising ; more observations should be made with these and other proved vectors in areas where filariasis occurs.

An experiment with men in 3 situations suggested that *C. fatigans* preferred to feed indoors ; other species preferred to feed outside. Very few culicine mosquitoes remained in the huts by day, the exception being *C. fatigans*. At the cattle sheds culicines fed all night, over 7,000 were caught in two nights ; *C. vishnui* and *C. gelidus* were the dominant species and only one *C. fatigans* was found. *H. S. Leeson*

VAN HELL, J. C. *A. (A) hyrcanus* **var.** *X* **as a Malaria Vector in South Celebes.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Dec., v. 3, No. 4, 373–80, 1 map.

[See also this *Bulletin*, 1951, v. 48, 514.]

JOHNSTONE, R. M. **Some Clinical Observations on the Prophylactic and Therapeutic Use of Proguanil in Mackinnon Road.** *J. Roy. Army Med. Corps.* 1951, Dec., v. 97, No. 6, 461–7.

Proguanil has been used for the prophylaxis and treatment of malaria among troops stationed at Mackinnon Road, Kenya, since October 1948. Between this date and September 1950, 185 cases of *P. falciparum* malaria occurred among British personnel who were supposed to be taking 100 mgm. proguanil daily. From March 1949 to August 1950 those who developed malaria, 122 in number, were under the author's care and are the subject of the present report. The incidence of break-throughs was 100 per 1,000 per annum for the whole period under review, with a peak of 268 per 1,000 per annum during the quarter December 1949 to February 1950. Ring forms of *P. falciparum* were found in the peripheral blood of 118 patients, while in 4 the diagnosis was made on clinical grounds only.

The cases are presented in 3 categories : (*a*) those with satisfactory prophylactic histories, (*b*) those with unsatisfactory prophylactic histories, and (*c*) those in whom the prophylactic history is unknown. These are again subdivided

into those who developed malaria without any apparent precipitating factor and those in whom a precipitating factor was present.

	Prophylactic History			
	Satisfactory	Un-satisfactory	Unknown	Total
Dysentery and diarrhoea	26	3	7	36
Tonsillitis and pharyngitis	7	—	3	10
Infective hepatitis ...	5	—	—	5
Sundry	8	—	—	8
No precipitating factor...	28	24	11	63
Total	74	27	21	122

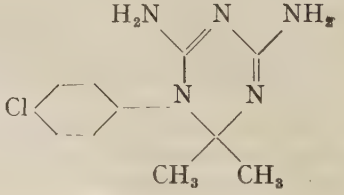
There were thus 28 cases (23 per 1,000 of the number at risk) who developed *P. falciparum* malaria without apparent reason.

In addition, 200 healthy soldiers took 100 mgm. proguanil daily under the supervision of an officer for 60 days. On the 30th day malaria parasites were observed in the peripheral blood of 5 of these.

The author puts forward 3 possible explanations for his findings and weighs the arguments for and against each of them. He concludes that the results are equivocal on the ground that certain essential data are lacking, and suggests the following desiderata for future investigation : (*a*) evidence that the persons involved are actually ingesting their proguanil ; (*b*) evidence that they are absorbing the drug ; and (*c*) in the event of any of them developing overt malaria, evidence that the strain of *Plasmodium* is or is not susceptible to proguanil. *G. Covell*

CARRINGTON, H. C., CROWTHER, A. F., DAVEY, D. G., LEVI, A. A. & ROSE, F. L. **A Metabolite of 'Paludrine' with High Antimalarial Activity.** [Correspondence.] *Nature.* 1951, Dec. 22, 1080.

It was shown [this *Bulletin*, 1947, v. 44, 648 ; 1949, v. 46, 334] that paludrine [proguanil] is converted to an active substance in the animal body. This substance has now been identified in the urine and faeces of rabbits and in human urine after treatment with the parent drug, by isolation as a crystalline picrate m.p. 206°, and is itself a crystalline basic substance m.p. 146° with 10 times the activity of paludrine in *P. gallinaceum* infection of chicks. Its identification was aided by its conversion on heating to an inactive isomeric substance which had previously been obtained by the authors. The ultra-violet absorption spectra of the two substances differed markedly. The active metabolite as well as a number of related substances also showing enhanced anti-malarial activity have now been synthesized from diguanides and aldehydes or ketones. The structure of the metabolite in question has been confirmed by X-ray crystallographic analysis and is 2 : 4-diamino-1-*p*-chlorophenyl-1 : 6-dihydro-6 : 6-dimethyl-1 : 3 : 5-triazine with the following constitutional formula.



J. D. Fulton

Khan, N., Suri, R. M. & Nair, P. M. **Camoquin in Malaria.** *Indian Med. Gaz.* 1951, July, v. 86, No. 7, 293–6, 1 graph.

One hundred and eighty malaria patients (135 *P. falciparum*, 45 *P. vivax*) in a hospital at Jamshedpur, Bihar, India, were treated with camoquin as follows :—

Group A. Four tablets of 50 mgm. each, as a single dose (200 mgm.).
Group B. Three tablets of 50 mgm. each, twice daily for one day (300 mgm.).
Group C. Two tablets of 50 mgm. each, twice daily for two days (400 mgm.).
Group D. One tablet of 50 mgm. twice daily for three days (300 mgm.).
Group E. (i) Four tablets of 50 mgm. each, twice in one day (400 mgm.).
(ii) Eight tablets of 50 mgm. each, in a single dose (400 mgm.).

There were 36 patients in each of the five groups. No information is given as to the state of premunition of the community from which they were drawn. No toxic effects were observed in any of the subjects treated.

The best results were obtained with those in Group E, parasites disappearing from the peripheral circulation in an average of 46·6 hours and the temperature falling to normal in an average of 24·8 hours. The response was slightly more rapid when the drug was administered as a single dose than when it was given in two divided doses. Comparing these results with those achieved at the same hospital with proguanil in 1948, the authors conclude that the action on parasites was somewhat slower with camoquin, but that on the clinical symptoms was more rapid. They consider that camoquin in a single dose of 400 mgm. is an excellent remedy for the mass treatment of malaria. *G. Covell*

Merland, R. & Cresté, M. Recherche de l'élimination de la Nivaquine et son dosage dans le lait de femme. [**Study of the Elimination and Estimation of Nivaquine in Human Milk**] *Méd. Trop.* Marseilles. 1951, Sept.–Oct., v. 11, No. 5, 793–5.

A case which occurred in hospital in Tananarive, in which an infant was suspected of having received a toxic dose of nivaquine from its mother's milk, suggested to the authors that nivaquine might be eliminated in the milk in quantities more toxic than had been believed.

They therefore estimated the quantity of nivaquine present in a specimen of human milk, to which this drug had been added, by means of Tanret's reagent. The extraction process and test are described in detail. It was found that the method could be used qualitatively for concentrations of nivaquine between 2 and 10 mgm. per litre of milk and quantitatively for 15 to 45 mgm./litre.

They then applied the estimation to 24-hour specimens of milk (about 50 cc.) from 35 nursing mothers who had had normal pregnancies and who had received no other drug which would have given a positive result with Tanret's reagent. Of these women, 27 had taken 6 tablets of 0·1 gm. nivaquine daily for 3 days, beginning with the third day after delivery. Eight others had the same dosage, with the addition of a daily injection of 300 mgm. nivaquine. The authors add that the low toxicity of nivaquine permitted them thus to exceed considerably the recommended curative dose of nivaquine used in the treatment of malaria.

Specimens for estimation were taken 24 hours after the first dose and were continued until 24 hours after the last : in all, 105 specimens were examined and no nivaquine was detected in any of them.

It is concluded that nivaquine is not eliminated in human milk, or if it is present there the concentration is less than 2 mgm./litre.

H. J. O'D. Burke-Gaffney

DESAI, V. G. **Paludrine (Proguanil) as a Suppressive and Prophylactic in *P. vivax* Infections.** *Indian Med. Gaz.* 1951, Aug., v. 86, No. 8, 343.

The author, in India, shows in tabular form the findings in the case of 15 patients with *P. vivax* infection who were treated in 1950 with mepacrine (0·2 gm. thrice daily for 2 days and 0·1 gm. thrice daily for 5 days). Thereafter they were given 0·3 gm. paludrine [proguanil] once weekly for 6 months. The follow-up treatment was given in the author's presence.

The table shows that relapses occurred (in two cases complicated by *P. falciparum* infection) in every case within 1 to 7 months and usually in less than 4. A final column shows that the relapses took place in 1 to 7 days after the last dose of paludrine and in most cases within 4 days. [No distinction is attempted between relapse and re-infection.] The author does not include patients who did not co-operate, so that " a correct relapse rate therefore could not be worked out ".

It is added that in earlier years, mepacrine (0·1 gm. daily) had been used as a prophylactic and " the relapse rate then was not as high as now ".

The author concludes " Paludrine is not a cent per cent prophylactic against vivax infections. Further, it is not as good a suppressive drug as mepacrine or atebrine " [but the evidence provided in the paper is hardly sufficient to justify these generalizations]. *H. J. O'D. Burke-Gaffney*

INST. ROY. COLONIAL BELGE BULL. DES SÉANCES. 1951, v. 22, No. 3, 701–50. Compte rendu des travaux des commissions chargées d'étudier l'organisation de la lutte contre le paludisme au Congo belge. Chap. I. Essai d'étude sur l'importance du paludisme dans la mortalité au Congo belge [DUREN, A. N.] (pp. 704–22). Chap. II. Rapport de la Commission de la prophylaxie médicamenteuse du Paludisme (pp. 723–34). Chap. III. Conclusions générales des travaux de la Commission pour la coordination des méthodes de lutte contre le Paludisme (pp. 735–44). Annexe : Note sur l'organisation des équipes et les besoins en matériel pour une campagne de DDT-Spray dans un centre congolais [WANSON, M.] (pp. 745–50). [**Report of the Commission Investigating Organization of Malaria Control in the Belgian Congo. I. Importance of Malaria in Relation to Mortality. II. Chemoprophylaxis. III. General Conclusions. Appendix, on the Organization of Spraying Teams**]

The Belgian Minister of Colonies arranged with Dr. RODHAIN, as President of the *Conseil Supérieur d'Hygiène*, to convene a Commission to study the whole question of malaria, the damage it does in the Belgian Congo and the means available and practicable for its control. The background for this included the varying success of insecticidal campaigns, and the divergent opinions which have recently been expressed on the importance of malaria in Africa and the desirability and practicability of its control. The work was delegated to two groups whose findings are published separately, followed by conclusions of the Commission, with an appendix on organization.

I. The first part is a study by Duren of the importance of malaria in the Belgian Congo. This has already been reviewed [this *Bulletin*, 1951, v. 48, 1059].

II. The second chapter consists of a study of drug prophylaxis ; after a statement of definitions and of products available the qualities of each of the latter are briefly reviewed. It is pointed out that drugs can be distributed to Europeans at monthly intervals and may be taken regularly in the meantime, but that for most of the African population administration would have to be under supervision, so that those drugs of which weekly administration is

sufficient are preferable for them. Quinine has an advantage over others in that it is cultivated in the country, though a review of costs shows that it would be the most expensive drug to use. It is concluded that drug prophylaxis is indicated for all Europeans and for certain categories of Africans, including young infants who can be regularly followed in clinics or other places, migrants from healthy to endemic areas such as labour forces, and the population of places where epidemics are common.

Any of the drugs may be used for Europeans, there being little to choose between them, though the Commission's order of preference is quinine, the 4-aminoquinolines, proguanil and lastly mepacrine. For Africans the 4-aminoquinolines are preferred for the advantage of widely spaced dosage, followed by quinine and proguanil as second and third choices.

III. The conclusions are put as answers to specific questions which may be summarized as follows :—

1. Is it possible to foresee the complete eradication of the principal vector anophelines in Central Africa with the means now at our disposal ?

The size of the territory, the forest habits of *Anopheles gambiae*, and its reaction to insecticides make this impossible. However, the Commission considered that it was perfectly possible to cause a very big reduction of malaria without attaining complete eradication of the vectors.

2. What measures can be used to diminish malaria throughout the Colony ?

In the immediate future an almost complete control could be obtained in urban and suburban areas by anti-mosquito measures, while a considerable reduction could be obtained in rural areas by combination of mosquito control and drug prophylaxis. A study of results in small rural areas could lead to the application of some or all of these methods to the whole territory in the more distant future.

In this programme residual insecticides would be the method of choice in rural areas, though the use of anti-larval measures is not excluded. Alternative choices of insecticide dose and periodicity are given for different circumstances, but the normal minimum will be 2 to 4 applications yearly of DDT at the rate of 0·5 gm. per square metre. It is foreseen that staff must be specially trained for this purpose, and a system of apprenticeship followed by advancement to the qualified grade remunerated as such, will be necessary. The types of anti-larval measures necessary are not enlarged upon as they are well known ; they would be employed primarily in towns but in some cases in rural areas—notably for the control of *A. funestus* breeding places.

3. To what extent is it practically possible to put these measures into operation ?

Complete control could not be immediately extended to the entire country but is possible in certain large areas where *A. gambiae* and *A. funestus* are the sole vectors. The Commission advises that work should be undertaken immediately in the towns and that pilot schemes should be started in the rural areas where extensive campaigns could be undertaken—four areas are named in this connexion in the Bas-Congo, beside Lake Tanganyika, an epidemic area in the Ruanda Urundi, and in the area where FOREAMI operates. The need to continue drug prophylaxis and other forms of personal protection where they are carried out is emphasized, and the authorities are warned against the possible occurrence of outbreaks due to loss of premunition, for which reason the campaigns should be continued for several years and preparations made to distribute drugs should epidemics make it necessary.

4. What form of organization should be adopted ?

Work should be carried out within the general framework of the existing medical service but directed by doctors specially deputed for the task working

under the authority of the Chief Medical Officer. These doctors should not be given any other work and improved arrangements for their training are very desirable, for which reason advantage should be taken of the World Health Organization proposals for courses on malaria in Africa.

Wanson contributes a detailed statement of the organization appropriate for a residual insecticide campaign for Léopoldville which has 200,000 African inhabitants. It consists of 8 groups each consisting of 4 gangs of workers. The gang comprises 5 sprayers, 1 literate driver foreman, 1 headman—preferably a sanitary inspector or a qualified *infirmier*, and 1 apprentice sprayer. The whole group would be under the charge of a European head not necessarily medical, with an African assistant chosen from the best of the gang headmen. The central staff would include a European mechanic with 2 trained mechanics, 4 assistant mechanics and 6 storekeepers. Uniform and protective clothing would be issued to all workers. Each gang would work from a lorry and have 7 pumps with minor replacements, while adequate spares would be maintained at the centre. *G. Macdonald*

Southern Rhodesia. Dept. of Health. Pamphlet No. 14. **Malaria and How to Combat it.** 16 pp., 6 pls. 1951. Salisbury : Rhodesian Printing & Publishing Co., Ltd.

In most of the areas settled by Europeans in Southern Rhodesia it is probable that the careful application of residual insecticides will so reduce the numbers of house-haunting anopheline mosquitoes that they will cease to reproduce themselves sufficiently to maintain malaria as a common and dangerous disease. However, in the districts of lower altitude, the low-veld, it may be necessary to combine the use of insecticides with anti-larval work and the taking of suppressive drugs.

This booklet is written for the European settler to give him briefly the facts of the mosquito life-cycles and the methods of control. While emphasis is laid on the application of residual insecticides to African dwellings, the haven of the infected mosquito, anti-larval methods are described and the protective measures of " screening " of houses, use of bed-nets and suppressive drugs are not omitted ; mepacrine or paludrine [proguanil] is advised.

[The modern nylon gauze for mosquito-proofing of houses is not mentioned as an alternative to metal gauze.] *R. Ford Tredre*

Mauritius, Colony of. *Publication No. 63.* **Malaria in Mauritius with Suggestions for Future Policy in regard to this Disease** [Rankine, A., D.M.S.]. 1951. 20 pp. [25 cents.]

Endemic malaria was unknown in Mauritius until 1865. There is little doubt that the vector mosquito was introduced by ship from Africa, an occurrence only possible when all the conditions necessary for survival and propagation of the mosquitoes are present on board the ship. Anopheline mosquitoes have not established themselves on the neighbouring island of Rodriguez. Successive drastic epidemics of malaria in Mauritius resulted in visits to the island by Ronald Ross in 1907 and Andrew Balfour in 1921. The following year an entomologist, Malcolm MacGregor, commenced a through investigation and soon showed that *Anopheles funestus* as well as *Anopheles gambiae* was a vector. He deduced that certain inland waters on the coastal plain were used as " winter refuges " by the mosquitoes for breeding purposes. In brief, his recommendations for control were education of the

public, the establishment of a malaria organization and destruction of the inland " winter refuges ".

From 1907 to 1942 the story of the struggle against malaria was one of waves of optimism accompanied by high effort, interspersed with troughs of inactive depression. The strategic importance of the island in 1942 and the presence of a considerable garrison of non-immune servicemen caused the government to invite C. R. HARRISON of the Ross Institute to advise the owners and managers of the sugar industry on measures of control on estates ; the military and naval Services conducted control in relation to Service establishments. In 1946 a Malaria Advisory Board was formed. In 1947 a joint effort by the Mauritian Government and the British Colonial Insecticides Committee was followed by the arrival of a research team in 1948 which instituted forthwith a residual insecticide campaign. [See DOWLING, this *Bulletin*, 1951, v. 48, 327 and below.] The incidence of malaria fell dramatically in all districts ; *Anopheles funestus* has almost disappeared but *Anopheles gambiae* persists in its normal breeding places.

What is future policy to be ? An attempt must be made to eradicate *A. gambiae* by destruction of adults and anti-larval measures in the " winter refuges ". Because eradication may be unsuccessful, and because of the possibility that *Anopheles gambiae* may become resistant to insecticide, relaxation in the maintenance of existing anti-malaria works must not be permitted. Indeed, with the rapidly increasing population simple measures of reclamation and drainage may convert undeveloped tracts of land into productive agricultural areas. In short, older methods of mosquito control are not obsolete and it is still advantageous to drain swamps, trim streams and attend to the sanitation of urban areas. At present the lowest-paid and the least intelligent employee is given the most important task of all, applying insecticide ; he should be a high-grade technician with a sufficient knowledge of mosquitoes to enable him to know how and where to apply insecticide or larvicide, how to maintain his equipment in serviceable order and how to make written records ; he should not require the frequent presence of an overseer, should be personally responsible for his sector and should be adequately paid, with the prospect of increments. *R. Ford Tredre*

DOWLING, M. A. C. **The Malaria Eradication Scheme in Mauritius.** *Brit. Med. Bull.* 1951, v. 8, No. 1, 72–5, 1 fig.

Mauritius is an island some 720 square miles in extent, with a population of approximately half a million. Malaria is said to have been introduced there in the middle of last century and there was a severe epidemic in the year 1867. *Anopheles funestus* is considered to be the chief mosquito vector, with *A. gambiae* playing a rôle of some importance during the summer months.

A malaria control scheme was inaugurated in November 1948, with the object of eradicating the two vector species by the application of residual insecticides. The island was divided into 3 zones, in one of which DDT in kerosene was applied and in the other two 50 per cent. wettable powders of DDT and BHC respectively. The first round of spraying began in January 1949 and was completed in all districts by May. All possible resting places for *Anopheles* were treated, including barns, temples, churches and factories, as well as the native dwelling-houses, outhouses and cattlesheds. The aim was to apply a surface deposit of 100 to 150 mgm. of DDT or BHC per square foot, and this was confirmed by chemical analysis of test papers and by rigid checking by the superior staff. At the second spraying DDT in kerosene was used in the zone formerly treated with BHC, the use of the latter having been discontinued on economic grounds.

The effect of control measures on the spleen and parasite rates is shown in the following table :—

Date of survey	Children examined	Spleen rate per cent.	Parasite rate per cent.
Before spraying, 1948	3,585	34·8	9·5
After 1st spraying, 1949	12,105	15·3	2·4
After 2nd spraying, 1950	14,577	2·8	0·37
After 3rd spraying, 1951	17,208	2·5	0·10

In 1948, 46,395 cases of malaria were notified, in 1949, 23,746 and in 1950, 6,021. The fall in the malaria rate continued in 1951, when during the first 5 months of the year there was a 97 per cent. reduction as compared with the same period of 1948. The death rate fell from a mean of 27·2 during the period 1934–48 to 16·6 in 1949 and 13·9 in 1950. The corresponding figures for infant mortality were 150, 91·0 and 76·4 per 1,000 live births. During the same period the birth rate showed a progressive rise.

The effect on the mosquito population was particularly interesting. *Anopheles funestus* and *Aëdes aegypti* have been virtually eliminated, but *A. gambiae*, though considerably reduced in numbers as judged by house catches, was still breeding freely throughout the coastal region in March and April 1950. During the same period this species was to be found without difficulty in new, unsprayed houses and cowsheds, while the adjoining sprayed houses were negative both to day and to night catches.

Since it was obvious that *A. gambiae* could not be eradicated by house spraying alone, it was decided towards the end of 1950 to supplement this by the treatment of breeding places with Shell Malariol High Spread oil. This was first applied in a selected district, where it proved sufficiently effective to warrant its extension to other parts of the island. It was planned to repeat the house spraying with DDT during the winter of 1951–52, in the hope that the two methods combined would eventually result in the eradication of *A. gambiae* as well as of *A. funestus*.

During the 2½ years in which the scheme has been in progress, the total cost of the campaign (including capital expenditure, running costs, salaries of United Kingdom and local personnel and costs of the laboratories and their equipment) has been a little over 3 shillings per head of the population of Mauritius. [See also this *Bulletin*, 1951, v. 48, 327.] *G. Covell*

Rafi, S. M. & Shah, I. A. **Evaluation of 50% Wettable DDT (Geigy) for Malaria Control in a Rural Area of Montgomery District in the Punjab (July 1, 1949 to March 31, 1950).** *Pakistan J. of Health.* 1951, Oct., v. 1, No. 3, 40–48, 3 graphs & 1 map.

Because it is easily portable and relatively cheap compared with DDT in malariol or kerosene, 50 per cent. wettable DDT (Geigy) powder was selected for field trial in a rural area of the Punjab in Pakistan (31°N., 73°E.). Breeding places of mosquitoes were ponds, seepages, drains and like water surfaces associated with an irrigation system. During the pre-operational phase house and room census, population census and spleen-parasite indices were obtained. For spraying 8 oz. of 50 per cent. wettable powder per gallon of water gave a wall and ceiling surface concentration of 120 mgm. per sq. ft. ; spraying was done on two occasions, during the first weeks of July and

September, 1949. During the post-operational phase the following data were collected :—

Fortnightly recording of malaria [fever] incidence, adult and larval catches ; spleen and parasite indices in January, 1950. All data are tabulated. Spleen rates fell from 58·75 to 16·5, parasite rates from 56·0 to 17·65 as compared with the following changes for untreated control villages : spleen rates 47·5 to 60 and parasite rates 40·0 to 37·7. These results were considered to be satisfactory and to justify the use of this preparation of DDT.

[The species of vector anophelines are not mentioned, nor is any reference made to the comparative prevalence of *Plasmodium falciparum* and *P. vivax*.]

R. Ford Tredre

VAN THIEL, P. H. & WINOTO, R. M. P. **Control of Hyperendemic Malaria in Java, caused by *A. sundaicus*, by DDT House-Spraying.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Dec., v. 3, No. 4, 295–319, 18 figs. [19 refs.]

Marunda is a hyperendemic village in Java in which malaria is transmitted by *Anopheles sundaicus*, the other common anopheline being *A. subpictus*. An experiment in prevention was carried out in this area with the use of the neighbouring village of Tjilintjing as a control, while the inhabitants of a third nearby village Leng Keng Ong were treated with nivaquine to prevent the importation of infected anophelines to Marunda spoiling the experiment. A 5 per cent. solution of technical DDT in kerosene was used, the dose of DDT being 2 gm. per square metre. Two applications were made with an interval of 6 months between them. The results were studied by a variety of techniques including trapping mosquitoes and observing the proportion surviving, and the release and subsequent search for test mosquitoes in untreated houses. At the same time observations were made on the biology of the two common mosquitoes. The first application caused an almost complete disappearance of *A. sundaicus* from the village. It was found that DDT was truly lethal to the species, the repellency which has been commented on by other writers being an attraction to light after the acquisition of a fatal dose, and it was also noted that the sprayed surfaces maintained their insecticidal action for at least 5 months. The effect seemed to wear off after this and as a result the second application was made. The anopheline findings and the malariometric indices are fully tabulated. The infant parasite rate decreased from 18 per cent. to zero, while lesser decreases were seen in other age-groups. The numbers of persons examined were, however, small. The programme was considered successful and its continuation recommended.

G. Macdonald

JASWANT SINGH, RAY, A. P. & NAIR, C. P. **Further Observations on Transmission Experiments with *P. knowlesi*.** *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 317–36, 3 charts & 2 pls. [36 refs.]

Using *Silenus* (=*Macacus*) *rhesus* as an experimental animal, the authors carried out transmission experiments with *Plasmodium knowlesi* in *Anopheles annularis* and *A. stephensi* (*mysorensis*), with special reference to the effect of the dose of inoculum, the incubation period and the course of infection.

P. knowlesi was successfully transmitted to monkeys with sporozoites (by inoculation of salivary glands and the bites of mosquitoes) of infected *A. annularis*, but *A. stephensi* was refractory to infection. It was found that the incubation period was determined by the dose of inoculum, its length

varying inversely with the dose. Furthermore, the intensity and course of the infection were directly influenced by the dose of inoculum, the infection in an animal receiving the heaviest inoculum being similar in intensity to that produced by a virulent strain of *P. knowlesi* and maintaining its virulence up to the 3rd passage. On the other hand, infection produced with sporozoites from a single mosquito tended to assume a chronic course.

In acute infections, the amoeboid parasites showed morphological variations, a certain percentage of host-cells were enlarged, and more than the normal amount of stippling was present. *C. A. Hoare*

Inoki, S. **Studies on the Exoerythrocytic Schizogony of the Malaria Parasite. Exoerythrocytic Forms of the Formosan Monkey Malaria Parasite,** *Plasmodium inui* **var.** *cyclopis*. *Med. J. Osaka Univ.* 1951, Mar., v. 2, No. 2, 45–53, 5 figs. [33 refs.]

Various monkeys (100 *Macaca cyclopis*, 3 *Macaca rhesus* [*mulatta*] and 3 *Macaca cynomolgus* [*philippinensis*]) were inoculated subcutaneously with blood containing malaria parasites identified as " *Plasmodium inui* var *cyclopis* ". Infections proved fatal in two weeks. The organs of dead or killed animals were examined in smear preparations. Brain smears were prepared by " mashing " pieces between two slides ; smears of kidney, liver, spleen, etc., were impressions taken after bleeding the animal and mopping up excess fluid from the cut surface of the organ with blotting paper. In two monkeys, so-called exo-erythrocytic parasites were found in spleen smears : they had a round or oval shape, measured at most 7·5 μ in diameter, with a maximum of 9 merozoites, and possessed no pigment. The nuclei were generally 2 μ in diameter and were " angular-shaped ". The parasites are said to be clearly contained in the cytoplasm of reticulo-endothelial cells.

[This discovery appears to be another example of the fallacies described so critically by Angelini (this *Bulletin*, 1948, v. 45, 24). Most workers now accept the large forms, with thousands of merozoites lying inside the parenchyma cells of the liver, as being the real tissue stages—and it seems unlikely that yet another cycle occurs in reticulo-endothelial cells after inoculation of infective blood. The possibility cannot be entirely dismissed, but in the opinion of the reviewer—who has not seen the preparations—the forms described here were probably ordinary erythrocytic parasites undergoing phagocytosis. The question of the identity of the parasite is discussed briefly below.]

P. C. C. Garnham

Inoki, S., Okuno, Y. & Aoyama, A. **On the Length of the Asexual Life Cycle of** *Plasmodium inui* **var.** *cyclopis*. *Med. J. Osaka Univ.* 1951, Mar., v. 2, No. 2, 37–43, 5 figs.

The length of cycle of asexual blood forms of a malaria parasite (*Plasmodium inui* var. *cyclopis*) of Formosan monkeys was determined by three methods—counting the number of ring forms, counting the number of segmenters, and measuring the size of the parasites, in blood films taken every three hours during several days. The estimates had to be made early in the infection, because synchronicity disappeared later. The results were plotted on graphs and clearly show a 48 hours' cycle, the ring forms being most numerous between 6 p.m. and 9 p.m. on alternate days, preceded by a peak of segmenters about midnight. The growth curve corroborated this finding, and the temperature chart demonstrated an access of fever when the ring curve was at its peak. It was noticed that nuclear division was often delayed until shortly before merozoite formation ; the large uninucleate bodies much resembled gametocytes.

[The authors open their paper by stating erroneously that *P. inui* has a 48-hour cycle. SINTON (this *Bulletin*, 1935, v. 32, 797) and others have shown that this species is a quartan parasite with a highly synchronous 72 hours' periodicity. Another characteristic of *P. inui* is its mildness in monkeys—yet Inoki claims that his parasite is highly lethal. To the original description (*Osaka Gaukkai Zassi*, 1942, v. 41, 1327)—in Japanese—of the Formosa subspecies, there is added a coloured plate which strongly suggests that the parasite belongs to the *cynomolgi* group ; should this prove to be the case, it would appear that the correct name of this malaria parasite would be *P. cynomolgi* var. *cyclopis* (INOKI, TAKEMURA, MAKIURA and HOTTA).] *P. C. C. Garnham*

CORRADETTI, A. & VEROLINI, Felice. Relazioni tra *Plasmodium berghei* e cellule della serie rossa durante l'attacco primario nel ratto albino. [**Relation of *Plasmodium berghei* to the Erythrocytes of the White Rat during the Primary Attack**] *Riv. di Parassit.* Rome. 1951, Apr., v. 12, No. 2, 69–84, 22 coloured figs. on pl. English summary.

In the original account of infection with *Plasmodium berghei* [this *Bulletin*, 1948, v. 45, 979] it was noted that this parasite produces an enlargement of the host-cell. This was also the impression of the authors before they started the present investigation, in which observations were made on the red blood corpuscles in 9 infected white rats. Daily examinations of the blood were made from the first appearance of parasites to the death of the hosts, and the relation of the parasites to mature and immature red cells was noted. The results are given in a number of tables and illustrated in a coloured plate. It was found that during the primary attack there is a progressive decrease in the percentage of mature erythrocytes which is accompanied by a progressive increase in the percentage of immature red cells, and followed—in the advanced stage of the infection—by the appearance of basophile erythroblasts. In lethal cases this sequence of events goes on till the host's death, while in rats which survive it lasts up to the parasitolytic crisis. The crisis is succeeded by a reversion of the process, *viz.*, the proportion of mature red cells gradually increases, that of the immature cells decreases correspondingly, whereas the erythroblasts disappear until (in 6–10 days) the blood picture becomes normal. From the beginning of the infection the parasites manifest a definite predilection for immature erythrocytes, up to 100 per cent. of which may be parasitized, whereas the percentage of parasitized mature erythrocytes does not exceed 11. This preference is favoured by the increasing output of immature red cells, which replace the mature erythrocytes destroyed in the course of the infection, until at the height of the infection (before its fatal termination or near the crisis) a maximum parasitaemia is reached, coinciding with a maximum proportion of immature erythrocytes in the circulation.

In the course of these observations it was noted that *P. berghei* does not *per se* produce enlargement of the host-cells, but their larger size, as compared with that of normal mature erythrocytes (4·38–9·13 μ in diameter), is due to the fact that in most cases the parasitized rat cells represent immature forms, which measure 6·13–13·13 μ in diameter. However, the gametocytes develop in mature erythrocytes exclusively, and their exflagellation takes place within 15–25 minutes. *C. A. Hoare*

RAMAKRISHNAN, S. P. & SATYA PRAKASH. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. I. Variations in Susceptibility in Albino Mice.** *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 361–7. [13 refs.]

The authors made 20 serial passages of *Plasmodium berghei* through 99 white mice, of which 55 acquired an infection but 44 were refractory. This natural

resistance to infection was manifested after inoculation with both high and low doses of inoculum. However, this resistance is not absolute, for some of the mice refractory to the first inoculation became infected after re-inoculation. The authors consider the bearing of heredity, age and immunity of the host on its resistance to malaria infection. *C. A. Hoare*

Ramakrishnan, S. P. & Satya Prakash. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. II. Morphology, Periodicity and Pathogenicity in Blood Induced Infections in Mice, Rats and Garden Squirrels.** *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 369–75, 1 chart & 26 figs. on pl.

The authors report the results of studies on the behaviour and appearance of *Plasmodium berghei* in experimental wild and white mice (*Mus musculus*), rats (*Rattus norvegicus* and *R. rattus*) and squirrels (*Sciurus palmarum*). Morphologically the parasite in all these animals conformed to the description from the original host [this *Bulletin*, 1948, v. 45, 979]. The asexual cycle has a periodicity of 24 hours, and the parasites show a predilection for polychromatophile erythrocytes. The course of infection in mice and some rats is acute, with high parasitaemia and a fatal termination, while in other rats and in squirrels it is milder and chronic, with latent and relapse periods.

Among the numerous mosquitoes (*Anopheles subpictus* and *A. stephensi*) fed on infected rodents, only one *A. stephensi* revealed some sporozoites in the salivary glands. When inoculated intraperitoneally into a clean mouse, they failed to infect it. *C. A. Hoare*

Yoeli, M. & Wall, W. J. **Complete Sporogonic Development of *Plasmodium berghei* in Experimentally Infected *Anopheles* spp.** [Correspondence.] *Nature.* 1951, Dec. 22, 1078–80, 2 figs.

Natural infections of *Plasmodium berghei* have been reported many times in *Anopheles dureni* [this *Bulletin*, 1951, v. 48, 714] ; a few immature oöcysts were produced in laboratory infections in *Anopheles maculipennis atroparvus* [*ibid.*, 871] ; now the complete sporogonic development of the parasite under artificial conditions is described. Successful infection was obtained in 3 species of mosquitoes—*Anopheles stephensi*, *A. maculipennis atroparvus* and *A. quadrimaculatus*. These mosquitoes were fed on hamsters infected 7 days previously with the S.P. 28S. Keiberg strain of *P. berghei*. This strain had been maintained for about a year in rats and mice, and produced large numbers of male and female gametocytes. After feeding, the mosquitoes were kept in a high humidity at a temperature of about 26° or 27°C. The results of dissections were as follows :—

A. stephensi 71 dissected ; 52 infected (3 of 23 had sporozoites in glands).
A.m. atroparvus 29 dissected ; 18 infected.
A. quadrimaculatus 10 dissected ; 7 infected.

The growth of oöcysts was rapid—on the 4th day they measured 7μ ; on the 5th, 11μ ; on the 6th, 16–18μ ; on the 7th, 18–21μ ; on the 8th, oöcysts were mature and measured 30–40μ. In *A. stephensi*, sporozoites (11·5–13μ long) were first detected in the salivary glands on the 12th day ; in the other two species, on the ninth. Few sporozoites appeared to be able to reach the glands, and Ross's black spores were found in the glands and gut from the tenth day after infection. Sporozoites from ruptured oöcysts (in *A. stephensi*) were inoculated into a young hamster which exhibited parasites 10 days later.

[The difficulty of obtaining heavy gland infections in these exotic species of mosquitoes suggests that the quest for a suitable laboratory vector of *P. berghei* is not yet at an end ; nevertheless, this work represents a great advance, and is promising inasmuch as transmission *via* sporozoites was successfully achieved.] *P. C. C. Garnham*

DE OLIVEIRA, M. X. Cultivo do " *Plasmodium gallinaceum* " em cultura de tecido. III. Estudo das formas responsáveis pela obtenção da cultura a partir de sangue infectado. [**Tissue Culture of** *Plasmodium gallinaceum*. **III. Study of Development in Culture of Infected Blood**] *Rev. Brasileira Biologia.* 1950, May, v. 10, No. 1, 115–19, 6 figs.

The object of this study was to determine whether the exo-erythrocytic forms of *P. gallinaceum* develop in the free reticulo-endothelial cells of the circulating blood of infected birds. For this purpose, blood was taken from infected chickens, in which the blood infection had been eliminated by treatment with quinine, leaving only the EE stages. The blood was then centrifuged and cells from the layer of leucocytes were cultivated by the tissue culture method used for growing monocytes. After 24 hours a zone of macrophages was formed in the cultures, from which smears were made daily, fixed with Bouin's fluid and stained by Giemsa's method. After 24 hours non-pigmented young schizonts were found in the macrophages, while after 48 and 72 hours respectively segmented forms developed in them and merozoites were formed. In control cultures of blood taken from birds at the height of parasitaemia, the macrophages were free of parasites. *C. A. Hoare*

INOKI, S. **Studies on the Exoerythrocytic Schizogony of the Malarial Parasite. Exoerythrocytic Forms of the Bird Malarial Parasites.** *Med. J. Osaka Univ.* 1951, Aug., v. 2, No. 3, 407–19, 2 text figs. & 12 figs. on 2 pls. [19 refs.]

The production of exo-erythrocytic forms of three avian malaria parasites was studied—*Plasmodium relictum* and *P. cathemerium* (local Japanese strains) in canaries, and *P. gallinaceum* (Philippine strain) in chickens. Infection was induced in 3 ways (i) by blood inoculation, (2) by sporozoite inoculation, and (3) by inoculation of suspensions of brain containing many exo-erythrocytic forms. The tissue stages were similar in the three species, except that mature schizonts of *P. gallinaceum* contained ten times as many nuclei as those of the other species. In *P. gallinaceum*, exo-erythrocytic forms were most numerous in the brain, lungs, heart and kidney, and were always contained in reticulo-endothelial cells. An interesting observation was made on the distribution of exo-erythrocytic forms after infection by brain suspensions : the forms became confined to the brain—the author suggests that once the tissue forms have become adapted to a certain organ, then other organs will rarely be attacked, and states that experiments should be carried out to see if a similar " organo-tropism " may be induced by using a suspension of other organs. The paper is illustrated by 12 photomicrographs. *P. C. C. Garnham*

HUNNINEN, A. V. **Comparative Susceptibility of Four Anopheline Mosquitoes to** *Plasmodium relictum*. *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 216-23.

New strains of *Plasmodium relictum* were isolated from starlings and English sparrows ; infections were established in sparrows, and various species of

mosquitoes were allowed to feed simultaneously on these birds. The developmental cycle in *Culex pipiens* (the well-known vector of this parasite) was used as a control to the infection in 4 species of *Anopheles—A. albimanus, A. quadrimaculatus, A. freeborni* and *A. crucians*. The results are well presented in a series of tables and indicated that the parasite was able to reach full development in all species of mosquito ; 80 per cent. of *A. albimanus* became infected (oöcysts and sporozoites), 54 per cent. *freeborni*, 35 per cent. *quadrimaculatus*, and 33 per cent. *crucians*, as compared with over 90 per cent. in the control (*C. pipiens*). In all species sporozoites accumulated in the salivary glands in large numbers, though they took longer to reach there in the anopheline than in the culicine mosquitoes—often requiring 17 to 20 days instead of 7–10. More than 1,000 oöcysts were found on some mid-guts ; the number varied according to the origin of the parasite—oöcysts were more plentiful if the mosquitoes had fed on a sparrow strain than on a starling strain.

The sporozoites obtained in these experiments proved to be infective to wild-caught sparrows, 50 out of 53 developing the infection. More than half died about a week after the inoculation with a massive exo-erythrocytic infection of liver and spleen. The brain was little affected ; some exo-erythrocytic forms appeared in the blood. Sporozoites were inoculated into 11 canaries, but the infection failed to develop. *P. C. C. Garnham*

Tokura, N. & Kawahata, H. **Observations on *Plasmodium elongatum* from Japanese Wild Birds.** *Yokohama Med. Bull.* 1951, Apr., v. 2, No. 2, 85–8, 3 figs. on pl. [16 refs.]

Plasmodium elongatum was discovered in various wild birds in Korea and Kurume. It was an uncommon parasite, being encountered twice in *Larvivora sibilans* (bush robin) and once in *Chloris sinica minor* (Japanese green finch). One strain was isolated and maintained in canaries for 6 years. In these birds the infection proved very lethal, killing 195 out of 200. The parasite showed the usual morphology and behaviour—with two exceptions : gametocytes were more numerous than schizonts, and after the fortieth passage, large endothelial forms were constantly encountered in brain capillaries. [The last feature might easily have been due to the accidental introduction, by a wild mosquito into the laboratory, of an avian *Plasmodium* of *relictum* type. This possibility and various others would have to be excluded before accepting the authors' suggestion that a " mutative variation " had taken place in their original strain.] *P. C. C. Garnham*

van Riel, J., Hiernaux-L'Hoëst, D. & Hiernaux-L'Hoëst, J. **Description of a Plasmodium found in a Bat, *Roussettus leachi*.** *Parasitology.* 1951, Dec., v. 41, Nos. 3/4, 270–3, 8 figs. on pl. [27 refs.]

A malaria parasite was found in the blood of 7 out of 81 fruit bats captured or shot in the caves of Mount Hoyo in the Belgian Congo. The bats comprised males and females of the widely spread African species *Roussettus leachi* ; 14 were studied in captivity in Antwerp, and blood films and impression smears of organs were examined. The parasite—named *Plasmodium roussetti*—begins as a small ring occupying one-quarter of the erythrocyte, dark brown pigment appears, and the annular shape persists until well on in development. The trophozoite is only slightly motile. The mature schizont contains 8 merozoites arranged as a rosette. Macro- and micro-gametocytes occur, the latter being almost colourless after Giemsa staining. The infected red cells

are fully occupied by the parasite ; they are not enlarged and they show no stippling. A foetus inside one adult bat showed parasites (gametocytes only in the blood with rare schizonts in the spleen).

The paper contains a useful summary of knowledge relating to bat malaria ; it is accompanied by photo-micrographs which clearly confirm that the organism is a true *Plasmodium*. *P. C. C. Garnham*

BLACKWATER FEVER

MILLER, J. H. & MCDONALD, R. K. **The Effect of Hemoglobin on Renal Function in the Human.** *J. Clin. Investigation.* 1951, Oct., v. 30, No. 10, 1033–40, 1 fig. [30 refs.]

Renal clearances of inulin and para-aminohippurate (PAH) were determined in 25 human subjects before and after the intra-vascular administration of a solution of stable reduced human haemoglobin or autogenous haemoglobin in doses ranging from 0·5 to 15·0 gm.

The injection of haemoglobin resulted in an increase of systolic and diastolic blood pressures and a decrease in pulse rate. The clearances of inulin and PAH were reduced ; the filtration fraction was increased ; the percentage of glomerular filtrate reabsorbed by tubules was increased ; the rate of urinary flow was decreased.

These effects were absent 24 to 48 hours after the injection.

In a most interesting discussion the authors conclude that renal vaso-constriction is induced by the presence of haemoglobin in the blood reaching the kidney. They suggest that this vaso-constriction plays an important rôle in the development of renal damage in haemoglobinuric states such as blackwater fever. They consider that both reduced glomerular filtration and increase in tubular reabsorption are important factors in the genesis of oliguria induced by haemoglobinaemia. Their experiments showed that this increase in tubular reabsorption could take place without tubular damage. The authors do not subscribe to van SLYKE's suggestion that the anuria of shock results from unselective tubular reabsorption.

[This paper provides clear evidence of the importance of the vascular factor in the genesis of renal dysfunction and failure in haemoglobinuric states put forward on previous occasions by the reviewer. It should be read in the original by those interested in the complex and controversial problem of acute uraemia.] *B. G. Maegraith*

MCDONALD, R. K., MILLER, J. H. & ROACH, Eleanore B. **Human Glomerular Permeability and Tubular Recovery Values for Hemoglobin.** *J. Clin. Investigation.* 1951, Oct., v. 30, No. 10, 1041–5, 1 fig. [17 refs.]

This paper describes an important sequel to the work carried out by two of the authors and reviewed above.

The findings and conclusions are quoted :—

" The mechanism of hemoglobin excretion by the human kidney has been studied in 19 subjects. It is concluded that hemoglobin is filtered by the glomeruli and recovered by the tubules to a limited extent. The glomerular permeability to hemoglobin was significantly lower (K=0·101) when hemoglobin

was administered at a slow rate (70 mg./min.) than when it was administered at a rapid rate (1,400 mg./min.) (K=0·162). The permeability of the glomeruli to hemoglobin averaged 12·9 per cent. of the glomerular permeability to inulin. The renal tubular recovery of hemoglobin averaged 17·1 mg. per 100 cc. of glomerular filtrate.

" It is suggested that the intravascular administration of hemoglobin alters glomerular permeability. How this effect is mediated is unknown, but the sequence of renal vasoconstriction followed by ischemic alteration of glomerular capillaries seems likely." *B. G. Maegraith*

TRYPANOSOMIASIS

LEWIS, D. J. **Notes on Tsetse Flies in the Anglo-Egyptian Sudan.** Reprinted from *Sudan Notes & Records.* 1950, v. 32, Pt. 1, 96–105. [23 refs.]

The information on the tsetse flies of the Anglo-Egyptian Sudan, to the middle of 1949, was assembled by the author in a previous paper [see this *Bulletin,* 1951, v. 48, 24]. The present paper comprises additional notes and records to March, 1950.

The 1950 map of tsetse distribution in the Sudan is already out of date and when a new map is prepared it is recommended that it should be on the 1 : 2,000,000 scale.

From the point of view of the control of *Glossina palpalis* it is recognized that the position of villages in relation to streams is important and in 1946 a system of dispersed villages was started as part of the resettlement scheme in the Zande area. The population in this area is 180,000, situated mainly in the wetter and more fertile land near the Nile-Congo divide. By the end of 1948 about 70 per cent. of the people had been resettled in 540 villages. Today, sleeping sickness is controlled chiefly by inspection of the population and treatment of cases and, as it is not now so urgent a problem in the Sudan, more attention is being directed to *Glossina morsitans,* the main vector of animal trypanosomiasis.

Published opinions on the status and distribution of the different forms of *G. morsitans* are discussed. The author's own view is that, in the Sudan, collected material indicates the existence of a gradual transition from *G. m. morsitans* in the east to a form approaching *G. m. submorsitans* in the west. North of Juba the transition is interrupted by the Nile swamps.

Additional records are given for the distribution of *G. morsitans,* and for *G. fuscipleuris, G. fusca, G. pallidipes* and *G. tachinoides.* *H. S. Leeson*

SQUIRE, F. A. **Observations on Mating Scars in** *Glossina palpalis* **(R.-D.).** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 601–4, 2 figs.

Mating scars are found on the raised copulatory cushions on the sternum of the sixth abdominal segment of mated female *Glossina palpalis* [this *Bulletin,* 1950, v. 47, 527]. Working in Sierra Leone, the author has studied the male and female genitalia of these flies and found that the male superior claspers are applied to the mating cushions of the female fly and are solely responsible for the scars. The blackening of the pits made by the points of the claspers may be due to the removal of the waxy layer and the oxidation of the polyphenols in the epidermis.

Copulation may take place in a fraction of a second but the pair remain *in copula* for a long time, sometimes for hours. During this time there may be much probing and readjustment, especially in nature or in a large cage, owing to disturbance. But scars may fail to develop on females in glass tubes in the laboratory where they remain undisturbed and still.

In nature unscarred females are nearly always extremely teneral, for mating usually takes place within a day or two of emergence or even within a few hours. The absence of mating scars can provide a fairly reliable index of the rate of emergence.

The results of dissections of the spermatheca are tabulated and show that scarred females have a high rate of impregnation. Females isolated from males have been found to have an abundance of spermatozoa in the spermatheca even after 18 days.

No mating scars were observed on *G. longipalpis* and *G. fusca* owing to the character of the claspers in those species. *H. S. Leeson*

BAUDART, M. Note conçernant la maladie du sommeil au Ruanda-Urundi et les résultats obtenus après 5 ans d'injections préventives de Pentamidine. [**Sleeping Sickness in Ruanda-Urundi and the Results of Five Years' Prophylactic Pentamidine**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase No. 149/0.* Léopoldville, Congo Belge. 1951, July 24, 4 mimeographed pp., 1 map & 2 charts.

Sleeping sickness in Ruanda-Urundi is localized to a relatively narrow strip of land of some 2,000 sq. km. bounded on the west by Lake Tanganyika, Lake Kivu and the river linking these two lakes (the Lower Ruzizi), and on the east by the mountains which constitute the watershed between the Congo and the Nile. This strip has an altitude of less than 3,000 feet, and it is grooved by numerous tsetse-infested rivers and streams running down from the mountains into the Ruzizi River or Lake Tanganyika. Food crops and cotton are grown, and the population is much denser than in the Belgian Congo (71·67 compared with 4·72 inhabitants per sq. km.). The infection occurs where the density is about 60 per sq. km. The population is gradually increasing, not only naturally but by the influx of people from the mountainous regions of Urundi to the east seeking employment with commercial or agricultural enterprises in the fertile and progressive plain, and by semi-nomadic folk coming in from the west, often in pirogues [dug-out canoes]. Those from the east do not carry any infection into the area, but those from the west are a constant source of reinfection.

This Ruzizi-Tanganyika plain has long been afflicted by sleeping sickness, and the medical reports of about 1910 referred to " extermination " of the population on the sides of Lake Tanganyika. The greatest number of new cases was 1,843 in 1926. Systematic treatment of detected cases and resettlement above 3,000 feet, of the population from south of Usumbura, starting in 1930, was followed by a marked decrease so that only 117 cases were diagnosed in 1944. In the southernmost part of the area (the Rumonge sector) no new cases were found from 1940 to the end of 1944, but in the northern zone, where medical staff was lacking, there was a progressive increase from 1939.

In December 1944, in the Rumonge sector, where there had been no cases for more than 4 years, 59 infections were suddenly detected in a well-delimited area. This led to the use of prophylactic propamidine in 1946 in the southern and western sectors, followed by prophylactic pentamidine (5 mgm. per kgm. repeated every 6 months) throughout the affected region, partitioned into 3 sectors, Shangugu to the north, Usumbura in the middle and Rumonge to the south. The incidence of new cases in the region as a whole was reduced from

1·07 per cent. in 1946 to 0·07 per cent. in 1950. The figures below show the number and the percentage incidence of new cases after each of the serial 6-month injections :—

After 1st injection	...	917	new cases	=	0·48 per cent.
,, 2nd ,,	...	255	,, ,,		0·16 ,, ,,
,, 3rd ,,	...	188	,, ,,		0·12 ,, ,,
,, 4th ,,	...	138	,, ,,		0·077 ,, ,,
,, 5th ,,	...	104	,, ,,		0·12 ,, ,,
,, 6th ,,	...	24	,, ,,		0·059 ,, ,,
,, 7th ,,	...	11	,, ,,		0·070 ,, ,,
,, 8th ,,	...	7	,, ,,		0·076 ,, ,,
,, 9th ,,	...	2	,, ,,		0·048 ,, ,,

[Although progressively fewer new cases were diagnosed after each consecutive 6-month period, over the span of 4 years covered by the 9 injections above, the figures show that this can be attributed to the (inevitably) progressively smaller number of people available for examination in each consecutive group. There is no clear evidence of any further reduction in the incidence of new cases after the 4th injection. The results illustrate the principle that prophylactic injections alone cannot eradicate the infection in an area which is seriously subject to reinfection from outside, unless the prophylactic operations extend far into the country from which the reinfection is imported.] *E. M. Lourie*

VINCENT, M. & LIÉTAR, J. Rapport Mel B. [**Report on Mel B**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase No. 148/0.* Léopoldville, Congo Belge. 1951, Aug. 10, 8 mimeographed pp.

Although this contribution is presented as a " Report on Mel B ", its main interest lies not so much in the results obtained as in the circumstances under which the drug came to be tested.

The work was done in Ruanda-Urundi, and the main features of the sleeping sickness situation in that territory have been described by BAUDART [see above]. The present contribution gives the further information that there is an unusually high prevalence of arsenic-resistant strains of trypanosome in the area, as a consequence of widespread treatment in the past by arsenicals for relapsing fever and yaws, both of which have always occurred endemically.

As described in Baudart's paper, prophylaxis by diamidines was started in August 1946, when the index of new cases was 0·96 ; by 1950 it had been reduced to 0·08, and the present authors say that of the 187 new cases diagnosed in that year all but 7 exhibited an altered cerebrospinal fluid, trypanosomes being found in the fluid of 95 of the cases. The authors were therefore faced with the dilemma of having to cope with a large number of patients in the stage where, from the clinical point of view, tryparsamide would be indicated, but where this drug would be unlikely to exercise much effect because of the arsenic-resistant nature of the trypanosomes. It was decided, therefore, to put Mel B to the test, and this was done in 4 new infections and 14 chronic patients who had already been treated unsuccessfully by repeated courses of tryparsamide. Results on the whole have been encouraging, in spite of some toxic incidents, but the authors themselves remark that it is too early yet to draw final conclusions in favour of Mel B and they will report again later.

[It would be instructive to know whether the extraordinarily high incidence of late infections, 180 out of the 187 new cases diagnosed in 1950, was found among people who had received prophylactic pentamidine. If so, this would be an excellent object lesson in favour of the precaution, which many workers

have stressed, of very thoroughly examining, for trypanosome infection, every person who is about to receive a prophylactic pentamidine injection, and of giving him a full course of therapeutic treatment instead.] *E. M. Lourie*

SPENA, A. La tripanosomiasi dei bovini nello Scioa (Abissinia). [**Bovine Trypanosomiasis in Abyssinia**] *Acta Med. Italica.* 1948, July, v. 3, Suppl. No. 3, 36 pp., 10 figs. & 3 folding pls. [20 refs.] English summary.

The author records the occurrence in Abyssinia (district of Addis Ababa) of a trypanosome—or "*Castellanella*", as he prefers to call it—of the *vivax* group in local and imported Italian cattle, in which the infection runs an acute or chronic course. The mortality from the disease is very low, the only deaths reported being in two imported animals, while the local race is more resistant to infection. In addition to cattle, the trypanosome is infective to sheep and donkeys, but dogs, monkeys, rabbits and guineapigs proved to be refractory.

Since there are no tsetse-flies in the district of Addis Ababa, and *Stomoxys* seemed to be the most likely vectors, experiments were carried out to determine the rôle of these insects in the transmission of bovine trypanosomiasis. In the "abdomen" [presumably the gut] of flies fed on infected bovines were found crithidial, herpetomonad and leishmanial forms of flagellates, as well as "metacyclic" trypanosomes, which the author regards as developmental forms of the bovine trypanosome. However, all attempts to infect calves by the bites of these insects or by inoculation of their intestinal contents were unsuccessful. The paper is illustrated by numerous figures.

[The author does not define the species of the trypanosome in question. But from its measurements (10·25–14·20–18·16μ in length) it would seem that he was dealing with *Trypanosoma uniforme*, a species which has hitherto not been recorded outside eastern and central Africa, or from areas free of tsetse. In considering the experiments with *Stomoxys* it must be borne in mind that even in their natural intermediate hosts (*Glossina*) the development of trypanosomes of the *vivax* group does not extend beyond the proboscis, and, since *Stomoxys* is probably only a mechanical vector, one would expect the trypanosomes to retain the blood form, without developing any further in this insect. It is therefore more likely that the flagellates found in its gut represent Herpetomonad parasites proper to *Stomoxys* itself.] *C. A. Hoare*

TORANZOS, L. B. El método de Breed en el recuento del *Trypanosoma equinum* Voges 1901, en sangre. [**Breed's Method for Counting** *Trypanosoma equinum* **in Blood**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 237–40. [12 refs.]

The English summary appended to the paper is as follows :—

"The author reports on the usual methods for counting trypanosomes in the blood, applying himself Breed's method with some modifications introduced. This method not only permits to establish the number of trypanosomes per mm^3 of blood, but also can be used for counting other hemoparasites, such as those of malaria or larger ones as microfilariae."

VON BRAND, T. **The Gaseous Exchanges of Trypanosome-Infected Rats.** *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 60–65.

"1. The rate of oxygen consumption of rats infected with *Trypanosoma equiperdum* and *Trypanosoma evansi* is significantly increased over the pre-infection level only during the last 36 hours preceding death.

"2. A slight increase in internal temperature is insufficient to explain this increase ; it is in part due to the oxygen consumption of the parasites. The increase is too little to allow the assumption that the parasites asphyxiate their hosts.

"3. The respiratory quotient of fed infected rats was higher than that of fasting infected rats even in the terminal stages of the disease. The implications of this finding on the sugar consumption theory of trypanosome injury are discussed, and it is concluded that it does not favor such a theory."

TORREALBA, J. F. Investigaciones sobre Enfermedad de Chagas en Zaraza (Estado Guárico — Venezuela). Otras Notas Científicas. Recopilación. [**Studies in Chagas's Disease in Zaraza, Guárico State, Venezuela, and other Collected Papers**] Fascículo III. 1951. 244 pp., 41 figs. & 4 charts. [Numerous refs.] Caracas : Tipografia Garrido.

In 1943 Dr. Torrealba published a fasciculus dealing mainly with his work on Chagas's disease ; three years later a second was published, half as long again as the first. These two were reviewed in this *Bulletin* [1947, v. 44, 187]. Now a third fasciculus has appeared bringing the subject down to 1950. The new record relates to 34 cases confirmed among 56 children examined at the rural school of Canta Gallo, and a family of four, a woman of 32 years, boys of 15 and 12 years and an infant of 8 months, all infected, and lastly, an acute case in a little girl of 5 months. Other sections tell of cases in different areas in the State of Guárico and also of cases of infection by *Trypanosoma rangeli*, one of these claimed to be the first in Venezuela, and an acute case of double infection by *T. cruzi* and *T. rangeli* in a boy 4 years of age ; other cases are reported in a subsequent paper. In the same district *Rhodnius prolixus* was found naturally infected by both trypanosomes and of 17 persons examined by haemoculture and xenodiagnosis, 12 were positive by xenodiagnosis, 6 for *T. cruzi*, 4 for *T. rangeli* and 2 for both.

Of investigations in Zaraza district, two sections are given up to earlier findings of 1937 and to the autopsy findings in two cases of sudden death from Chagas's disease in 1938. Two others of interest are reported by the author, one of acromegaly in a man of 42 years, and one of the Aran-Duchenne type of progressive muscular dystrophy in a man of 36 years whose illness had begun 16 years before after an intravenous injection of trypaflavin. Both these are illustrated by photographs. The publication ends with a list of 71 papers published by the author, alone or in collaboration, between 1922 and 1949, 10 of them since 1946 when the previous fasciculus was published. The work is profusely illustrated with photographs of patients.

H. Harold Scott

ROMAÑA, C. & KIRSCHBAUM, M. Encuesta sobre enfermedad de Chagas en las vecindades de Andalgalá (Catamarca). [**Survey of the Incidence of Chagas's Disease in the Inhabitants of Andalgalá, Argentina**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 123–8.

The English summary appended to the paper is as follows :—

"The authors carried out a serological and electrocardiographical survey in an unselected group of 94 individuals between 16 and 50 years of age, in Andalgalá, province of Catamarca, Argentina. The aim was to investigate the frequency of Chagas' disease in the medium and the incidence of cardiopathy in the positive compared with that in the negative cases.

" *Schizotrypanum cruzi* was found in 35 individuals among the 94 examined. " The 'association coefficient' between positive cases and those with anomalous electrocardiogram was q=0·5 which indicates existence of a positive association.

" Thus, once again the relationship between infection by *S. cruzi* and cardiopathy is established."

ROMAÑA, C. & DE MONDOLFO, A. A. Papel del sistema linfático en la propagación del *S. cruzi* en el período inicial de la enfermedad de Chagas. [**Rôle of the Lymphatic System in the Spread of** *T. cruzi* **in the Early Stages of Chagas's Disease**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 129–32, 1 fig. on pl.

The English summary appended to the paper is as follows :—

" The authors show that mice and guinea pigs experimentally infected by inoculation of cultures of *Schizotrypanum cruzi* permit the finding of multiplication foci of the parasite not only at the point of inoculation, but also along the lymphatic lacunae, in the wall of the lymphatic vessels which lead towards the regional ganglia and within the ganglia themselves.

" The authors arrive at the conclusion that the infection spreads along the lymphatic vessels immediately after the inoculation producing multiplication foci of *S. cruzi* at the same time near the point of infection, in the lymphatic system and in the regional ganglia."

ROMAÑA, C. & TORANZOS, L. B. Contribución a la patogenia de la enfermedad de Chagas. Duración del período previo a la generalización del parásito. [**Pathogenesis of Chagas's Disease. Duration of the Period before Generalization**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 133–6.

The English summary appended to the paper is as follows :—

" The authors carry out experiments with guineapigs which were inoculated by way of the conjunctiva with feces of *Triatoma infestans* rich in *Schizotrypanum cruzi*.

" The xenodiagnostics performed daily, starting at the day after inoculation, showed that only from the fifth day on the first trypanosomes can be found circulating in the blood of the animals. This lapse agrees with that of the maturation of the first generation of the parasites which multiply within the tissues."

BRIONES, S. Xenodiagnóstico para enfermedad de Chagas en niños de la Gobernación de La Pampa. [**Xenodiagnosis of Chagas's Disease among Children in La Pampa Territory, Argentina**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 147–52, 2 maps. English summary (3 lines).

In 1936 and 1937 MAZZA and MIYARA reported finding 39 per cent. of *Triatoma infestans* [? total examined] infected by *T. cruzi* and in 1942 KORN and CABELLA found 6 acute cases of Chagas's disease in the district. In 1946 and 1948 ROMAÑA and his colleagues carried out 579 xenodiagnostic tests in Tucumán and other parts of the country [see this *Bulletin*, 1947, v. 44, 404] and found 80 (13·8 per cent.) positive. Included in these 579 are 200 which are the special subject of the present paper. This deals with 7 localities in La Pampa in which schoolchildren were examined by xeno-diagnosis for infection by *T. cruzi*. Except in Cayupán, a small village, in which 11 children were tested and none

proved positive, infected subjects were found in small numbers. In two, Uriburu and Lonquimay, where 28 and 16 tests were made respectively, only one was found positive in each ; in two others, La Gloria (17 tested) and Catriló (40 tested), only 2 in each. In General Acha, a well sanitated district, of 46 tested 8 were positive and of some 250 specimens of *Triatoma patagonica* caught in trees and cactus close to dwellings, all were found infected. Lastly, in Santa Rosa, a district of 14,000 inhabitants, with much waste land and rudimentary dwellings with earthen floors and roofs and poor sanitation, heavily infested with *T. infestans*, 9 children were positive among 42 examined. Altogether, of the 200 children examined in this way 23 were positive (11·5 per cent.). *H. Harold Scott*

Laranja, F. S. Evolução dos conhecimentos sôbre a cardiopatia da doença de Chagas. Revisão critica da literatura. [**Critical Review of the Literature Regarding Present Knowledge of Cardiac Lesions in Chagas's Disease**] *Mem. Inst. Oswaldo Cruz.* 1949, Sept.–Dec., v. 47, Nos. 3/4, 605–69. [185 refs.]

Pizzi, T. **Effect of Primaquine on Experimental** *Trypanosoma cruzi* **Infection.** *Proc. Soc. Exper. Biol. & Med.* 1951, Nov., v. 78, No. 2, 643–4. [10 refs.]

" Primaquine showed a strong suppressive action during the early stages of experimental *T. cruzi* infection in mice. Most treated animals survived infection with a virulent strain and all showed a disappearance or marked decrease in the number of parasites present in the blood. The activity of the drug seems to be stronger than other drugs so far known to be effective against *T. cruzi* infections."

LEISHMANIASIS

Dutta, S. C. **A Case of Post-Kala-Azar Dermal Leishmaniasis.** *Indian Med. Gaz.* 1951, Aug., v. 86, No. 8, 354–5.

" A case of post-kala-azar dermal leishmaniasis with ulceration is described. There was no co-existent leprosy or tuberculosis. The case is complicated by the presence of syphilis."

de Sampaio, L. F. O aparecimento, a expansão e o fim da leishmaniose no Estado de São Paulo. [**The Source of Origin, Spread, and Future of Leishmaniasis in São Paulo**] *Rev. Brasileira Med.* Rio de Janeiro. 1951, Oct., v. 8, No. 10, 717–21.

The origin of cutaneous leishmaniasis in São Paulo appears to have been the start of railway construction in the north-west of the State in 1905. In 1909 several patients presented themselves with a disease in all respects corresponding to *bouton d'orient*, designated Baurú ulcer, because the first patients came thence. They were working in the wooded areas where *Phlebotomus* (locally *biriguis*) abounded. The area affected was large, comprising one-third of the State. The author describes the clinical condition, which was typical, and its treatment by antimonials. *Phlebotomus* were caught and leptomonad forms found in them. There follows a detailed account of the spread of infection from village to village as the work extended. Not only were human beings and domestic animals attacked, but also wild animals which were found showing similar ulcers. Such included the tapir (*T. americanus*), the spotted

cavy (*Coelogenis paca*) the coati (*Sasyprocta*) [*sic*—presumably *Dasyprocta*, an agouti], the capibara (*Hydrochoerus hydrochoerus*) and others. Infection among human beings is much reduced by preventive inoculation, injection of 100–120 millions of the leptomonad forms in phenol ; 3 injections are given at weekly intervals. It appears to be proving very efficient ; the infection is dying down and as the wooded areas are diminishing, it is hoped that cutaneous leishmaniasis will, ere long, be eliminated. *H. Harold Scott*

FEVERS OF THE TYPHUS GROUP

GIROUD, P. Les rickettsioses en Afrique équatoriale. [**Rickettsial Diseases in Equatorial Africa**] *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 4, 535–46. [33 refs.]

This is a convenient summary of more than 20 papers, of which the author was the sole or the senior contributor, on the rickettsial diseases of Equatorial Africa. Most of these papers have already been reviewed in this *Bulletin* but readers will be glad to have the wealth of information contained in them in so accessible a form. The author describes the technique of his rickettsia-agglutination test which he regards as being better and quicker than the complement-fixation test. The one drawback is that no suitable suspensions of *Rickettsia orientalis* are available. *John W. D. Megaw*

WORMS, R., GIROUD, P., PÉQUIGNOT, H. & ISRAËL, L. Un nouveau cas sporadique de typhus épidémique. Isolement et identification de la souche infectante. [**Another Sporadic Case of Epidemic Typhus**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1951, Nos. 25/26, 1098–103. [13 refs.]

The authors describe a case of louse-borne typhus of the Brill type. The patient, aged 45 years, remembered having been attacked by typhus fever at the age of 12 in his birthplace in Poland. A typical strain of *Rickettsia prowazeki* was isolated and 12 passages were made through guineapigs, 40 of which were employed, and only 2 of them had scrotal reactions.

The rickettsia-agglutination test of the patient's serum was negative on the 10th day, but on the 29th day both *R. prowazeki* and *R. mooseri* reacted at 1–640 ; on the 51st day the titre with the former was 1–320 and with the latter it was 1–80.

The Weil-Felix titre with *Proteus OX19* never rose above 1–200.

It is stated that about a score of such cases have been described in western countries of Europe during the past 5 years. [See, for example, this *Bulletin*, 1950, v. 47, 833, 970.] *John W. D. Megaw*

MURRAY, E. S., PŠORN, T., DJAKOVIĆ, P., SIELSKI, S., BROZ, V., LJUPŠA, F. GAON, J., PAVLEVIĆ, R. & SNYDER, J. C. **Brill's Disease. IV. Study of 26 Cases in Yugoslavia.** *Amer. J. Pub. Health*. 1951, Nov., v. 41, No. 11, Pt. 1, 1359–69. [25 refs.]

An organized investigation was carried out in eastern Bosnia, where large numbers of cases of louse-borne typhus were known to have occurred in recent years, with a view to finding the degree of prevalence of Brill's disease.

With the co-operation of the local doctors specimens of blood were obtained from 38 patients who had " fever, a severe intractable headache, and a previous history of typhus ". Rickettsia-agglutination tests with *Rickettsia prowazeki*

were carried out in each case on two or more occasions at intervals of 2 weeks ; 26 of the patients had titres of more than 1–200 or rises in titre of more than 4-fold and were regarded as probable cases of Brill's disease.

Samples of the same sera were stored and sent later for detailed examination to the Harvard School of Public Health.

Definite histories of previous attacks of typhus fever between 1938 and 1945 were given by 21 of the patients. None had been vaccinated against typhus.

The clinical features observed in 19 hospital patients were : severe persistent headache throughout the febrile stage ; a rash was seen in 9 cases ; the mean duration of the fever was 8½ days ; the range was less than 6 to 10½ days ; there were no deaths and only one patient was severely ill.

Of the 26 cases 23 had Rickettsia-agglutination titres of 1–800 or more ; the other 3 had a titre of 1–400. The complement-fixation titres observed at Harvard were higher than 1–320 in every case ; in 23 cases they were 1–2,560 or higher at some stage between the 12th and 21st day of the illness. The titres with epidemic typhus antigen were always at least 4-fold higher than those with murine antigen. The Weil-Felix reaction was completely negative in 18 cases ; in the others there was a reaction with *Proteus OX19* at 1–10 to 1–80.

The possibility of fresh infection was excluded and no secondary cases occurred. *John W. D. Megaw*

Wojciechowski, E. Wpływ podłoza na właściwości antygenowe i zjadliwość riketsyj duru plamistego. [**The Influence of the Substrate on the Antigenic Properties and the Virulence of Typhus Fever Rickettsiae**] *Med. Dośw. i Mikrob.* Warsaw. 1951, v. 3, No. 4, 345–59, 6 charts.

The English summary appended to the paper is as follows :—

" Comparative investigations were performed on three strains of R. prowazeki. From these strains two (W_2 and VI) were grown in louse intestines, as also in yolk sacs of embryonated hen's eggs and in mouse lungs. The third strain (VII) was propagated only in lice and in mouse lungs. No morphological differences could be observed between strains from various sources. There were also shown no qualitative antigenic differences between strains propagated in hen's eggs and mouse lungs in comparison with strains obtained from lice intestines ; the rickettsial agglutinogen from mouse lungs showed a lowered sensibility.

" More-distinct differences were observed in the strain W_2 in its immunizing properties ; a vaccine prepared from mouse lungs did not confer immunity on guinea pigs infected with 200 infecting doses of rickettsiae, whereas vaccines from louse guts and yolk sacs of hen's eggs given in full and half-dose conferred total protection in guinea pigs. Better immunizing results gave vaccines from rickettsiae treated with ether.

" The virulence of rickettsiae from various substrates was the same for body lice and guinea pigs ; in all cases was observed a typical infection."

Justin-Besançon, L., Cornet, A. & Giroud, P. Manifestations intestinales chez une ancienne typhique. Syndrome sérologique du typhus exanthématique. [**Intestinal Manifestations in a Former Typhus Patient. The Serological Syndrome of Exanthematic Typhus**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1951, Nos. 27/28, 1167–74. [11 refs.]

A patient who had suffered from a severe attack of louse-borne typhus in 1943, followed by a long convalescence lasting a year, was admitted to hospital in 1949 for an exacerbation of enterocolitis which had persisted for nearly 4 years.

The agglutination test with *Rickettsia prowazeki* was positive at a titre of 1–200 and a course of chloromycetin [chloramphenicol] was given (3 gm. daily for 10 days). Immediately after this the agglutination titre was 1–640. The enterocolitis persisted for about 3 months and a laparotomy was carried out at which some bands of adhesion were divided. The patient then made a good recovery.

The case is discussed at some length but no definite conclusions were reached.

John W. D. Megaw

Siegert, R. Experimenteller Beitrag zur Wirkungsweise des Aureomycins auf die *Rickettsia prowazeki*. [**An Experimental Study of the Action of Aureomycin on** *Rickettsia prowazeki*] *Arb. a. d. Paul-Ehrlich-Inst. u.s.w. Frankfurt/M.* 1950, No. 48, 87–103, 10 figs. [21 refs.]

The action *in vitro* of aureomycin on *Rickettsia prowazeki* was tested on the same general lines as have been adopted by previous workers.

The drug in high concentrations had a pronounced rickettsiacidal and antitoxic effect. *In vivo* a single dose of 30 mgm. per kgm. given intraperitoneally to guineapigs during the incubation period or during the febrile stage completely suppressed the manifestations of the illness.

Prophylactic and early curative treatment interfered with the development of full immunity in the animals; the later the treatment was started the higher was the degree of immunity.

The drug caused neither quantitative nor qualitative changes in the antigenic properties of the rickettsiae. *John W. D. Megaw*

Otto, R. Vorschriften für die staatliche Prüfung der Impfstoffe zur aktiven Schutzimpfung gegen Fleckfieber. [**Regulations for the Official Testing of Typhus-Fever Vaccines**] *Arb. a. d. Paul-Ehrlich-Inst. u.s.w. Frankfurt/M.* 1948, No. 47, 4–9.

Typhus vaccines cannot be sold in Western Germany till they have been approved after tests carried out at the Government Test Institute. Full details are given of these tests and of the standards that must be reached before a certificate of approval is issued for a batch of vaccine and each dose must be marked with the date of issue of the certificate. The present regulations were issued in 1948, and they supersede the original regulations dated 1943.

John W. D. Megaw

Harvey, M. S., Forbes, G. B. & Marmion, B. P. **An Outbreak of Q Fever in East Kent.** *Lancet.* 1951, Dec. 22, 1152–7, 3 figs. [18 refs.]

This is a detailed report on the clinical, laboratory and epidemiological studies carried out in connexion with the outbreak of Q fever which occurred at the College of Art, Canterbury, in June, 1950. A preliminary note on the outbreak has already been abstracted [see this *Bulletin*, 1951, v. 48, 542].

Among 204 persons at the college there were 28 clinical attacks of the disease and in all but one of the 24 who were tested the complement-fixation reaction was positive at titres ranging in most of the cases from 1–16 to 1–64; in two the titre was 1–256.

In nearly all the cases the onset was sudden, and severe headache was the most prominent symptom. Mild gastro-intestinal disturbances occurred in 15 cases. There was stiffness of the neck in 11 patients. Respiratory symptoms were observed in only 5 cases.

The illness was mild; the fever lasted 4–6 days.

There must have been a considerable number of inapparent infections because among 20 of the students, taken at random from those not known to have been ill, 9 had complement-fixation titres ranging from 1–8 to 1–32.

After a thorough investigation of the outbreak it was possible to exclude all the usual sources of infection with the possible exception of inhalation of infected dust.

About 12 days before the onset of the first case and 22 days before the onset of the last, a packing case which had been stored "for some years" in a room in the main building was opened and was found to contain wood shavings, paper and mouldy, dusty straw. It was carried through the central corridor for unpacking outside the building in conditions which favoured the contamination with dust of the air of the central hall and the tea-room, so that most of the students had opportunities of inhaling dust particles from the straw. One of the two persons who unpacked and reconstructed the case had a trivial illness afterwards and her serum, tested 8 months later, had a titre of 1–8 with *R. burneti*. A statue was packed in the case with fresh straw and sent to London where it was unpacked by two persons, one of whom 12 days later became ill with a headache which lasted about 4 days, and her serum, examined 20 weeks later, had a titre of 1–8 with the fixation test.

Low-titre reactions were found to occur among random samples of sera from persons in Canterbury and other parts of Kent in 1 to 4 per cent. of various groups of the population. *John W. D. Megaw*

Le Gac, P., Giroud, P., Rouby, M. & Lagarde, J. Premier cas de pneumonie atypique à *Rickettsia burneti* observé en Oubangui-Chari (A.E.F.). [**First Case of Atypical Pneumonia due to** *Rickettsia burneti* **seen in Oubangui-Chari**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 11/12, 726–8, 1 fig.

Welsh, H. H., Lennette, E. H., Abinanti, F. R. & Winn, J. F. **Q Fever in California. IV. Occurrence of** *Coxiella burnetii* **in the Placenta of Naturally Infected Sheep.** *Pub. Health Rep.* Wash. 1951, Nov. 9, v. 66, No. 45, 1473–7.

Among 72 fresh placentas of sheep from 8 infected ranches 21 were found to be infected. Among 47 tests carried out simultaneously on guineapigs and hamsters, 6 were positive in both animals and 5 were positive in hamsters but negative in guineapigs. An unexpected finding was that among 29 placentas from serologically negative sheep 6 were positive—21 per cent., as compared with 35 per cent. for reacting sheep. In one serologically-positive sheep there were more than a billion (1,000 m.) infecting doses for hamsters per gm. of placenta : the highest number in a non-reacting sheep was 10,000 doses per gm. *John W. D. Megaw*

YELLOW FEVER

de Caires, P. F. **The International Yellow Fever Problem in the Caribbean Islands.** *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 3–14, 1 fig.

Yellow fever is known to have been prevalent in the Caribbean from the early seventeenth century, there being many records of epidemics with heavy mortalities. It has been absent for some years and immunity surveys in

urban areas in 1937 showed low incidences in the islands and coastal territories, and an absence of evidence of past infection in children, but similar tests made in the interior of British Guiana show that the disease is still common there.

The eradication of *Aëdes aegypti* on a continental basis is now being attempted and the author urges the advisability of co-operation in this work. The Caribbean lies at the centre of travel routes and an outbreak of the disease could be disastrous. The methods used are described briefly and the cost of a two-year campaign is estimated at 45 cents per inhabitant. *G. Macdonald*

RABIES

Remlinger, P. & Bailly, J. Virus rabique renforcé chez un rat d'égout. [**Virulent Rabies Virus in a Sewer Rat**] *Bull. Acad. Nat. Méd.* 1951, v. 135, Nos. 33/34, 582–3.

This is an account of a case in which a man was infected from the rat.

Field, E. J. **The Pathogenesis of Rabies following Inoculation into the Masseter Muscle.** *J. Comp. Path. & Therap.* 1951, Oct., v. 61, No. 4, 307–14, 7 figs. on 2 pls. [29 refs.]

" Inoculation of the masseter muscle of the rabbit with fixed rabies virus does not lead to an early paralysis of the masticatory muscles of the same side. In five out of thirteen animals paralysis began in the hind limbs.

" Severe lesions occur in the dorsal root ganglia of both sides and are much less intense in the lumbar than in the cervical region.

" No lesion was found in the corresponding motor nucleus of the fifth nerve even when there was already evidence of widespread involvement of the nervous system.

" Spread of the blood stream and cerebrospinal fluid is briefly considered."

Nakagami, S., Nakano, M., Kondo, A., Yaoi, H. & Otani, S. **Studies on the Rabies Vaccine. Vth Report : On the Development of Rabicidal Antibodies in Dogs and Cows, immunized with Merzonin-Vaccine and other Live Anti-Rabies Vaccines for Canine Use.** *Yokohama Med. Bull.* 1950, Dec., v. 1, No. 2, 121–9. [17 refs.]

A comparison of the efficiency of Merzonin-inactivated rabies vaccine with that of other vaccine preparations is made. [Merzonin is sodium ethyl-mercurithiosalicylate, and a note on its use is recorded in *Bulletin of Hygiene*, 1951, v. 26, 93.]

From neutralization tests it is concluded that despite the fact that Merzonin vaccine contains about half as much nervous tissue as the other vaccines tested it is a more efficient immunizing agent. The authors also conclude that the order of superiority of routes of vaccination in dogs is intraperitoneal, intradermal, subcutaneous. [There is not enough evidence to merit this conclusion.]

The Merzonin vaccine was used to treat two cows which were bitten by a rabid dog. These cows were first given a " canine vaccine ", one was slaughtered as a veterinarian suspected that it had rabies, and the other lived. It is concluded that the Merzonin-vaccine was effective in arresting rabies among cows. [No such conclusion is, of course, justified.]

G. W. A. Dick

YAOI, H., MIKAMO, Y., OTANI, S., NAKANO, M., KONDO, A. & NAKAGAMI, S. **Studies on the Rabies Vaccine. VIth Report : Some Inquiries into the Causes of the Failures of the Anti-Rabies Treatments with Pasteur's Desiccated Cord.** *Yokohama Med. Bull.* 1950, Dec., v. 1, No. 2, 131–45. [21 refs.]

The authors of this paper set themselves the very ambitious task of confirming the actual merits of anti-rabies vaccine treatment, using the Pasteur method as practised in Japan.

A number of preparations were studied for their effect on mice and the authors conclude from these experiments that, (1) the generally accepted view that attenuation of fixed virus runs parallel with the time of desiccation is not acceptable, (2) the degree of immunity conferred on mice by the vaccines was proportional to the amount of live virus in the preparation tested, and (3) the longer the desiccation, the less the active virus and the less the antigenicity of the vaccine. [However true any of these conclusions may be, the reviewer does not think that the authors' data are sufficiently quantitative to establish any of them. It is possible that in the rendering of the paper into English, typographical errors may have arisen, and while it is of value to be able to read this work in English, it is most regrettable to find no fewer than 6 discrepancies between the figures in the tables and those in the text.]

In studies which were made to demonstrate protective antibodies in human sera, after vaccination by the Pasteur method, records of 14 vaccinated cases are presented. [All of these were vaccinated, but it is not stated if every patient had contact with, or was bitten by, a rabid animal. Furthermore, no end points are given with any of the sera except one, and it is therefore not possible to draw any conclusions on the levels of antibody.] Of interest was the fact that there were two cases of paralysis after treatment, and one death, in a person who had received the full course of treatment. *G. W. A. Dick*

PLAGUE

POLLITZER, R. **Plague Studies. I. A Summary of the History and a Survey of the Present Distribution of the Disease.** *Bull. World Health Organization.* Geneva. 1951, v. 4, No. 4, 475–533, 3 figs. [149 refs.]

Except for 5 pages dealing with a historical summary of plague the whole of this paper of 57 pages consists of a detailed statement of the recent distribution of plague all over the world. There are three good maps and 149 references. The types of rodent reservoirs, insect vectors and probable routes of invasion are stated. The paper is a valuable work of reference on the subjects with which it deals. *John W. D. Megaw*

MACARTHUR, W. P. **The Occurrence of the Rat in Early Europe. The Plague of the Philistines (1 Sam., 5, 6).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Mar., v. 46, No. 2, 209.

In this letter Sir William MacArthur takes exception to the opinions expressed by Dr. POLLITZER [see above] on two historical points.

In the first place he contests the statement that the rat was not present in Europe before the 12th Century, when it was imported by the Crusaders on their way home. MacArthur quotes four authorities to prove the contrary,

and asks how the Justinian plague (A.D. 542 onwards) could possibly have spread throughout Europe, causing widespread fatal epidemic disease, in the absence of rats.

Secondly, he disagrees—and disagrees very strongly—with the identification of the biblical plague with dysentery and piles. Dysentery does not cause piles, and an epidemic of piles is to his mind incredible. The Hebrew word *t'horim*, meaning some kind of anal swelling, was a marginal substitution for the word *ofalim*, meaning swellings or tumours. The word *ofalim* in this connexion referred to tumours of the groin and, because of its sexual association, was regarded as indecent. The fact that mice rather than rats are mentioned in the biblical narrative presents no difficulty, since in Greek and Latin the same word was used for both. [Pollitzer is not alone in regarding the plague of the Philistines as dysentery complicated by piles. At least three papers expressing a similar view have been published within the last 10 years. Sir William MacArthur's letter is therefore very opportune, giving as it does good historical reasons for rejecting a view which to many students must appear as a travesty of clinical and epidemiological commonsense.]

G. S. Wilson

Fain, A., Schoetter, M. & Ampe, R. Guérison de trois cas de Peste humaine dans la région d'endémie pesteuse du Lac Albert. [**Cure of Three Cases of Human Plague in the Plague-Endemic Area of Lake Albert**] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 541–6.

In one case of plague of the pneumonic type and another of the septicaemic type there was a prompt response to treatment with streptomycin (6 gm. daily in doses of 1 gm. every four hours) and sulphadiazine (12 gm. daily in doses of 2 gm. every fours hours).

Plague meningitis in a child of 7 responded immediately to intramuscular injections of streptomycin (0·5 gm. once daily for 3 days).

John W. D. Megaw

Link, V. B. **Plague on the High Seas.** *Pub. Health Rep.* Wash. 1951, Nov. 9, v. 66, No. 45, 1466–72. [13 refs.]

The author tells the story of the campaign against rat infestation in ships and ends with the gratifying conclusion that " the world is free of ship-borne plague ; and it is almost inconceivable that any considerable amount of future spread by sea should occur, provided that we continue to maintain ships free from rats ".

The last instance of detection of plague among rats in ships is stated to have been in April, 1938. As long ago as 1926 it was officially reported that rat-proofing was being incorporated into all vessels under construction.

This happy result is a good example of what can be done by coordinated international effort. *John W. D. Megaw*

Schulz, K. H. **Notes on Wild-Rodent Plague in South Africa.** *J. Trop. Med. & Hyg.* 1951, Dec., v. 54, No. 12, 249–55. [10 refs.]

The author describes the epidemiology of plague in South Africa where the disease is now almost entirely of the sylvatic type. The most important reservoirs of infection are the gerbils, especially *Tateroma lobengula*, which are purely rural in their habits, and the multimammate mouse, *Mastomys coucha*, which occasionally burrows in human dwellings and so serves as a link between gerbil and man.

An interesting description is given of the indications by which experienced observers can detect signs in the haunts of the gerbils indicating the onset and development of epizootics among the animals. *John W. D. Megaw*

SMITH, A. **The Effect of Relative Humidity on the Activity of the Tropical Rat Flea** *Xenopsylla cheopis* **(Roths.) (Siphonaptera).** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 585–99, 4 text figs. & 4 figs. on pl. [42 refs.]

These studies on flea behaviour were concerned with activity, speed of movement and aggregation. The experiments were conducted at 25°C. in specially designed chambers which are described and illustrated.

The fleas (*Xenopsylla cheopis*) moved little in atmospheres of one humidity but when presented with a choice of two humidities they moved about for some time. The percentage difference between the two humidities (the humidity gradient) stimulated the insects to activity and at the higher humidities the greater proportion of the total movement was by jumping rather than by crawling.

This movement always resulted in the collection of fleas in the drier side of the apparatus. If the humidity gradient was kept constant, the number of the fleas in the drier side was greater towards the moister end of the scale. There was no difference in the degree of aggregation in the drier side between fed and unfed fleas or between the sexes at 80 and 90 per cent. relative humidity.

In several experiments the fleas were first kept at certain humidities for periods varying between 5 minutes and 5 days before being introduced to the choice chamber. From the results it is concluded that previous conditioning to high humidities stimulates activity and leads to aggregation in the drier side of the apparatus.

In other experiments fleas were kept in jars in which the air was maintained at certain humidities and when a roll of lint was dropped into these jars it was observed that more fleas jumped on to the roll at the higher humidities than at the lower. When these experiments were repeated with a rat there was a similar result up to a range of between 70 and 78 per cent. relative humidity ; but at the range 83 to 88 the results were inconsistent.

The flea index was studied in a colony of rats which was kept in a room at 25°C. ; the floor was covered with flea-infested bedding. After one week rats were caught and their fleas removed from them ; this was repeated for 3 days, thus providing a flea index for rats exposed to infestation for one week and for one day. The estimated total adult flea population of the room fell during the period of the experiment and (in relation to the size of the population) the flea index increased with a rise in the relative humidity of the room and bedding. This relationship was more distinct in those rats which had been exposed for a week and at the highest humidities there was a higher proportion of males than females on the rats.

An attempt to discover whether humidity receptors were confined to the maxillary palps of the flea was inconclusive. *H. S. Leeson*

CHOLERA

SWAROOP, S. **Endemicity of Cholera in India.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 141–83, 8 maps.

The relative endemicity of cholera in different parts of India was investigated on the basis of examination of mortality figures by three different methods.

The first method consisted in determining the average incidence in each district for the 10 years in which the lowest mortality was experienced during the period from 1901 to 1945. On the figures obtained the districts were classified as "highly endemic", "moderately endemic" or of "low or doubtful endemicity", or "non-endemic". The method was not considered to demarcate endemic areas in any absolute sense but would serve to exclude areas in which endemic zones of cholera cannot be expected to lie. On an arbitrary basis contiguous districts showing a mean annual rate above 0·4 per mille (average of 10 lowest years) are classified as "highly endemic", those showing between 0·2 and 0·4 per mille were classified as "moderately endemic" and between 0·1 and 0·2 per mille as of "doubtful endemicity". Eighteen districts were classified on this basis as "highly endemic"; of these, 15 are in Bengal, 2 in Orissa and 1 (Sylhet) in Assam. In the "moderately endemic" group there are 5 districts of Bengal, 3 of Assam and 5 of Bihar. In the "doubtful endemic" group there are 4 districts of Bengal, 3 of Assam, 7 of Bihar, 3 of Madras and 8 of the United Provinces. The areas in which the disease tended to persist at high level are shown to be generally in deltaic regions or to be in connexion with large rivers. A relatively greater degree of persistence of cholera is also shown in two groups of districts in which the important pilgrim centres of Hardwar and Nasik are situated, as compared with the surrounding districts.

The second method adopted for measuring relative endemicity was the determination of the frequency and length of periods of freedom from cholera deaths which has been experienced in the districts, based on the monthly figures for 30 years. The total number of occasions on which each district was continuously free for one, two or more months at a time was worked out. Out of 205 districts 9 districts did not have even one month free from cholera deaths in the period. Of these, 8 were in Bengal and 1 in Assam.

In Table II the districts are shown which were free from cholera only for one month at a time, for 2 months, for 3 to 5, and for 5 to 12 months. Most districts of Assam and Bihar, and all districts of Madras, the United Provinces, the Central Provinces and Bombay come into the groups showing maximum periods of freedom from cholera of 3 to 5, and 5 to 12 months. The classification by the method corresponds fairly well with that based on the study by the method of lowest mortality of 10 years.

The third method was based on the study of the average number of weekly periods of freedom from cholera during the last 10 years. The findings by this method were also in agreement with those obtained by the two previous methods apart from a new district of endemic importance being shown in Bombay Presidency.

A final classification of districts in order of endemic significance was made on the basis of the findings by the three methods. This is shown in Table III, districts of Madras Presidency being placed at the lower end of the scale.

"In regard to the location of the geographical groups in which endemic areas are expected to lie, the following observations may be made :—

"1. All endemic areas are located generally around rivers.
"2. All these tracts lie in areas of high population density.
"3. All of them lie in low-lying lands, i.e., none is more than 500 feet above sea-level.
"4. All these tracts lie in areas of high absolute humidity."

The relationship of cholera to physiographical features is illustrated by a comparison of the relative incidence of the disease in low-lying wet irrigated areas and dry un-irrigated areas both situated within the limits of the Tanjore District of Madras Presidency and even within the limits of a single taluk of the district. A much higher incidence is shown in low-lying wet areas.

"How certain sets of physiographical features favour endemicity is a matter for further investigation but the present study strongly suggests that their connection with the water systems indicated deserves prime attention." *J. Taylor*

SWAROOP, S. **Endemiology of Cholera in the Madras Presidency.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 185–96, 3 maps (1 coloured folding).

Statistical analysis has shown that there are two groups of districts in the Madras Presidency in which cholera persists relatively longer than in others. These are the districts of Tanjore, South Arcot and Trichinopoly in the Cauvery Delta and the districts of East and West Godaveri and Kistna in the Kistna-Godavari delta. The author, in considering their status as endemic centres of cholera, refers to Russell's conclusions, based on a previous study, that almost every cholera epidemic in Madras was occasioned by an invasion ultimately traceable to Bengal, but also that "the long persistence and high mortality of cholera in the deltaic tracts, viz. the major portion of Tanjore district together with smaller parts of Trichinopoly and South Arcot, lead one to the conclusion that cholera is to a certain extent endemic there". Later some doubt had been expressed by the Cholera Advisory Committee of the Indian Research Fund Association on the endemic status of the area.

The subject has been re-investigated on more detailed figures and an attempt has been made to relate cholera experience to topographical and other features. It is recognized that within the confines of a district with an average population of one to three millions physiographical and other factors may vary widely and for this reason mortality figures were studied for the smallest unit for which they were available, *viz.*, the taluk. The figures for the 15-year period 1934–1948 were examined on the basis of the average cholera death rate of the 5 years showing lowest incidence, as a measure of the minimum level to which incidence will fall. The groups of taluks in the two deltaic areas showing high mean incidence are shown in two maps. Levels are higher in the Cauvery delta area which covers 4,150 square miles and has a population of 3·4 million as compared with the Kistna-Godavari area covering 5,105 square miles and having a population of 2·9 million. A detailed account is given of the topography, irrigation systems, agriculture, rainfall and habits of the people in the Cauvery delta. The area is traversed by innumerable irrigation channels on which villages and hamlets are situated and is liable to periods of flooding and stagnation. The channel water is used for drinking, there being no protected water supplies. The habits of the people result in continuous faecal contamination. High salinity of the water accompanies the stagnation in the channels. The economic level in the area is very low and there is much migration from food-deficiency areas in search of food and labour. The Tanjore district contains many important festival centres which are visited every year by large numbers of pilgrims. These conditions would be likely to "flood the area with infection, contaminate the water-system and cause occasional outbreaks of the disease". The Kistna-Godavari delta is similar in being an irrigated area with paddy as the main crop and liable to floods and inundation. The supply of labour and the standard of living is also similar. On the other hand the Kistna-Godavari delta has an irrigation system separate from the drainage system, and there, water is preferred from tube wells or open wells with the result that there is less risk of drinking the contaminated water of a drainage system. The water is not brackish. The sanitary habits of the people in the Kistna-Godavari delta entail less risk of contamination of water used for drinking purposes. There are also differences in period and volume of water flow, density of population and in the numbers travelling to festivals.

In discussing " endemicity " the author refers to two types of factors which may be at work in an area, *viz.*, " (1) those tending to propagate infection, *i.e.* factors conducive to the survival and multiplication of vibrios and (2) those tending to eradicate infection ". He considers that a truly endemic area will be one in which the first set of factors is always dominant. Some variation in endemic status may be expected according to the degree in which the first set of factors will keep those of the second category in check. In certain circumstances a break in continuity of infection may occur even in a highly endemic area.

The conclusion is reached that no attempt should be made to classify clear-cut categories of endemicity or non-endemicity but rather to measure the relative degree of endemicity of different areas. *J. Taylor*

GALLUT, J. Sur les modifications *in vivo* des caractères de quelques vibrions isolés des eaux en période d'épidémie de choléra. [*In vivo* **Modifications of Characters of Certain Vibrios Isolated from Water During a Cholera Epidemic**] *Ann. Inst. Pasteur.* 1951, Sept., v. 81, No. 3, 275–80.

Investigations were undertaken in relation to the report by YU (*Far Eastern Assoc. Trop. Med.* 10th Congress. 1940, v. 2, 465) that certain non-cholera vibrios isolated from river water in Shanghai during an epidemic of cholera, had acquired the serological characters of true *V. cholerae* after 5 intraperitoneal passages in mice in mucin suspension. Out of 20 strains passaged, 16 were stated to show partial cholera " O " agglutination, and 1 strain showed a high level. The biochemical characters of the strains did not show a corresponding change except that they lost their haemolytic power. Yu had suggested the possibility that such change might account for the occurrence of an epidemic of cholera without importation of fresh infection. The author carried out similar investigations with 7 water strains isolated at Ismailia during the 1947 epidemic of cholera in Egypt. The strains were of different serological and biochemical types and they did not belong to a consistent group. They showed one or more of the " non-specific minor O antigenic fractions of the cholera group " [see this *Bulletin*, 1949, v. 46, 631] and 6 out of the 7 had some degree of co-agglutinability. When the strains were re-examined before mouse passage, they were found to have undergone changes from the serological and biochemical characters noted on first receipt, but in no case had they varied spontaneously towards the characters of true *V. cholerae*. The 7 strains were submitted to 10 serial intraperitoneal passages in mice, both in mucin suspension, and in saline. After each passage, agglutination tests were made with " O " specific (A) cholera serum and with a serum prepared against strain No. 145 which contained the antigens common to 6 out of the 7 strains. The biochemical tests employed included the cholera-red test, haemolysis test, Heiberg's test and the Voges Proskauer reaction. Ten passages, with or without mucin, did not result in the appearance of either the specific A factor or the major factors B and C of *V. cholerae*. When passaged in saline suspension they retained their original antigenic characters as verified by the use of serum 145, but passaged in mucin they lost their agglutinability with this serum. Changes in biochemical characters, which were very irregular, occurred after passage, but these were of much the same order as had been noted when the strains were kept in deep culture.

The author considers that the partial agglutination found by Yu may have been due to the presence of non-specific minor " O " factors for which agglutinins were present in the cholera serum employed for tests. The presence of these factors does not justify a diagnosis of *V. cholerae*.

The author's observations do not support Yu's conclusions. *J. Taylor*

AHUJA, M. L., KRISHNAN, K. V., PANDIT, S. R. & VENKATRAMAN, K. V. **Laboratory Diagnosis of Cholera. A Note on Bacteriological Procedures.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 135–9.

This is a note on the methods recommended for the diagnosis of *V. cholerae*, which was prepared by the study-group of experts on cholera (WHO/OIHP) who visited India in November 1949 [this *Bulletin*, 1951, v. 48, 549]. It is intended as a guide for public health authorities and laboratory workers engaged in the isolation and identification of the vibrios. The methods described are not claimed as original.

Collection of specimens.—Freshly passed stools or freshly taken rectal swabs may be plated at once on solid media. If there is a delay of some hours, or if the specimen has to be sent to a distant laboratory, a small portion of the stool should be put in the preserving medium described in Appendix I. This is a potassium-chloride/boric-acid buffer medium at *p*H 9·2 containing 2 per cent. sea salt. Vomit or soiled material may similarly be taken in the preserving medium.

Microscopic examination.—This is carried out on films stained with carbol-fuchsin and on wet films prepared from washed flakes of mucus. Morphological appearances are not diagnostic and non-cholera vibrios often found in stools are similar to *V. cholerae*.

Cultural examinations.—Fresh stools or preserved material should be plated on alkaline nutrient agar or a differential medium such as Aronson's medium or a modified Wilson and Riley's solid medium of which the composition is given in Appendix II. It has been found that direct plating gives results superior to those obtained with preliminary enrichment. Aronson's and the Wilson and Riley medium have the advantage that they to some extent inhibit El Tor strains and many inagglutinable vibrios. Batches of Aronson's medium are sometimes found to be poorly supportive of growth of *V. cholerae*. Enrichment is desirable in the case of examination of stools of convalescents and contacts. Read's modification of Wilson and Blair's fluid enrichment medium (Appendix III) has been found most useful for the purpose, especially when vibrios are very scanty in the stool. The entire specimen in 10 cc. of the preserving medium is cultured in the fluid enrichment medium and a few loopfuls of the culture are plated on Riley's solid medium after 18 to 20 hours' incubation.

When examining large numbers of specimens from contacts it is convenient to pool the specimens in groups of ten and later, if a positive result is obtained, to examine the original preserved specimens individually by enrichment and plating.

Identification of V. cholerae.—Colonies on Aronson's or Riley's medium have a characteristic appearance. These should be picked off and tested by slide agglutination against a suitable dilution (1 in 50 to 1 in 100) of a serum containing both Inaba and Ogawa O agglutinins or against separate Inaba and Ogawa O sera. This will be sufficient basis for a provisional diagnosis of *V. cholerae* during an epidemic, pending a fuller examination of cultures obtained from the tested colonies. For confirmation cultures should be made on nutrient agar slants and in tubes of Douglas broth. A suspension of an 18- to 24-hour growth on nutrient agar made in 0·85 per cent. salt solution containing 0·2 per cent. formalin with a density of approximately 2,000 million vibrios per ml. (Brown's opacity tube No. 2) is used for serological tests. These are carried out in the water bath at 52°C. O agglutination appears early and a first reading should be taken at the end of 2 hours. A final reading should be made after the tubes have stood overnight at room temperature.

The haemolysis test is done on 24-hour Douglas broth cultures. One ml. of the culture is added to 1 ml. of a 5 per cent. suspension of washed goat's

erythrocytes, the mixture being incubated at 37°C. for 2 hours and then kept in the cold room overnight. The cells should not be fragile in 0·65 per cent. saline.

Fermentation tubes should be inoculated from the Douglas broth culture. *V. cholerae* will produce acid without gas in glucose, mannose, saccharose and maltose but not from lactose or arabinose. The cholera-red reaction is carried out by adding a few drops of pure sulphuric acid to a 24-hour peptone water culture. It is not distinctive for *V. cholerae*. The Voges-Proskauer reaction is negative. A provisional diagnosis can be given in 16 to 20 hours and a definite report in 48 hours. *J. Taylor*

Paris, C. & Gallut, J. Utilisation d'un test biochimique complémentaire pour l'identification du vibrion cholérique. [**An Additional Biochemical Test for the Presumptive Identification of Cholera Vibrios**] *Ann. Inst. Pasteur.* 1951, Sept., v. 81, No. 3, 343–6.

The power of sodium citrate to support the growth of vibrios was tested in the case of 108 strains of *V. cholerae* and 47 strains of non-cholera vibrios. The media used were Simmons' solid synthetic medium and Koser's liquid synthetic medium.

In the Simmons medium 94 strains gave good growth after 24 hours ; 4 gave slight growth at 24 hours and well marked growth after 2 to 3 days ; 4 were negative at 24 hours, but positive after 10 days ; 6 did not show any growth in 10 days. The number of El Tor strains tested was 15, of which 12 gave a positive result after 10 days. Of 32 non-cholera strains, 17 were positive after 10 days.

In Koser's medium the results were more difficult to read unless the inoculum was a heavy one and bromothymol was added at the opportune moment for reading the result. When this was done the results were similar to those in Simmons' medium. The Simmons medium is preferred for the test.

The results in the Simmons medium are compared in a table with those of the cholera-red reaction, Heiberg's test and Voges Proskauer test. It is noted that none of the tests is specific for *V. cholerae*, but the author considers that the sodium citrate test in the Simmons medium is a useful additional presumptive test for *V. cholerae*. *J. Taylor*

Seal, S. C., Ghosal, S. C. & Ghosh, M. M. **A Preliminary Trial of Aureomycin (I.V.) in the Treatment of Cholera.** *Indian Med. Gaz.* 1951, July, v. 86, No. 7, 287–9.

During the waning period of an epidemic of cholera in Calcutta 12 cases, 9 of which were confirmed bacteriologically, were treated with aureomycin, a similar number being taken as controls. All were admitted in the stage of collapse, and had received practically no treatment before coming to hospital. The drug was given intravenously in three doses at 6-hour intervals in 10 ml. saline solution, the usual saline and glucose transfusions being also given.

With the dose of 100 mgm. aureomycin first employed, there was a rise of about 2°F. in temperature, and vomiting in some cases. When the dose was reduced to 50 mgm. there was no appreciable reaction. Symptoms of uraemia developed in 6 or 7 out of the 12 treated cases, and only in 4 of the controls. There were 4 deaths in the treated cases as compared with 3 in the controls. The treated cases appeared to have been of a more severe clinical type.

No therapeutic advantage was demonstrated by the trial.

J. Taylor

PANDIT, S. R. **A Note on Cholera in Assam and the Cholera Bacteriophage Experiment carried out in Assam.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 197–210. [10 refs.]

This paper sums up the results of the very extensive trials of the value of bacteriophage for prevention and treatment of cholera which were carried out in Assam in 1929 and subsequent years [see, for example, this *Bulletin*, 1934, v. 31, 891 ; 1935, v. 32, 460 ; 1937, v. 34, 418].

A widespread distribution of bacteriophage was made in selected areas, and the results obtained in persons who had been attacked and had or had not been inoculated with cholera vaccine were compared with those receiving neither. Efforts were also made to assess the value of bacteriophage in prophylaxis and its effect on the infectivity of the cholera case.

The evidence obtained was difficult to assess and in 1934 an *ad hoc* Committee appointed by the Scientific Advisory Board of the India Research Fund Association undertook an examination of the results of all trials carried out with cholera bacteriophage in India. "The Committee was of opinion that conclusive evidence had not been presented with regard to the value of bacteriophage in the treatment of cases for community prophylaxis, but that 'some of the Assam figures suggest strongly that the infectivity of nature-borne cholera has been decreased by the use of bacteriophage in early treatment . . . . 'As regards its value in the treatment of cholera, the Committee considered that, while Morison's work showed that bacteriophage treatment was far better than no treatment at all, there was no conclusive evidence that it was better than any other recognized treatment and could not supplant the well-known public health measures, such as anti-cholera inoculation, chlorination of water and disinfection of excreta." In 1944 the Cholera Advisory Committee of the I.R.F.A. repeated the recommendation that the use of bacteriophage should not replace such measures as anti-cholera inoculation etc., on the basis of further evidence which had accumulated. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

DESCHIENS, R. La nutrition de l'amibe dysentérique. [**Nutrition of the Dysentery Amoeba**] *Biologie Méd.* 1950, Mar.–Apr., v. 39, No. 2, 57–91, 11 figs. [26 refs.]

The author gives a detailed review of the state of knowledge regarding nutrition in *Entamoeba histolytica*, preceded by an account of its bionomics and life history, and considers the bearing of these data on the aetiology of amoebiasis and its pathogenesis. From observations *in vitro* it is seen that *E. histolytica* is adapted to an isotonic medium with an optimum *p*H of 6·8 and to an anaerobic existence. The trophic amoebae also find these conditions *in vivo*, in the tissues invaded by them and in the large bowel. Encystation of the amoebae is promoted *in vitro* by a rapid change in the oxidation-reduction potential of this medium, when it rises from −400 to −250 millivolts. A corresponding change taking place *in vivo* leads to cyst-formation in the intestine. *E. histolytica* readily consumes haemoglobin and its derivative, bilirubin, as well as meat powder, some teased-up tissues, rice-starch, and lastly certain forms of bacteria. While the predilection for haemoglobin explains its haematophagous habits, the tropism for bilirubin throws light on the selection of liver in metastatic infections. In general, this amoeba is a heterotrophic organism, feeding on substances already synthesized by its host or by the concomitant

bacteria, while the ingestion of particulate food is effected by means of pseudopodia. The food-particles are then surrounded by vacuoles, where they are impregnated with diastases which release the appropriate ferments for their digestion. The products of metabolism are eventually discharged through the body wall.

Among the food requirements of *E. histolytica* in pure mixed culture are water, mineral salts (especially NaCl), proteins (17 amino-acids), 11 vitamins, cholesterol or rice-starch. The presence of bacteria is necessary *in vitro* but not *in vivo*, for within the tissues the amoebae live in the absence of other micro-organisms. Moreover, in the case of the closely related reptilian parasite, *E. invadens*, it has been demonstrated that the bacteria can be substituted by teased-up organs of embryos [see this *Bulletin*, 1952, v. 49, 145]. However, particulate food appears to be essential for the nutrition of *E. histolytica*.

C. A. Hoare

NAKAMURA, M. & ANDERSON, H. H. **Evaluation of some Chemotherapeutics against** *Endamoeba histolytica* **in Cultures with** *Trypanosoma cruzi*. *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 66–9. [14 refs.]

By obtaining cultures of *E. histolytica* with *T. cruzi* in the absence of bacteria [PHILLIPS, this *Bulletin*, 1950, v. 47, 624, 741], a marked advance in the *in vitro* testing of potential amoebicides was made possible. In contrast to bacteria *T. cruzi* remains unaffected by practically all known chemotherapeutic agents and it is easier to decide whether the action of drugs on *E. histolytica* is direct or indirect. The present authors have re-investigated the effect of certain known amoebicides and antibiotics in the trypanosome-amoeba cultures. The usual methods were employed and in addition the cultures were sealed with melted petrolatum [see BRADIN and HANSEN, this *Bulletin*, 1950, v. 47, 538]. After 48 hours' incubation in presence of the drug the cultures were examined for amoebae. Control tubes showed that the trypanosomes were unaffected by any of the agents tested, which included aureomycin, actidione, polymyxin B, bacitracin, carbarsone, diodoquin, emetine, a thioarsenite, terramycin and vioform soluble. The results were in agreement with those of the authors quoted above and the authors conclude that a reliable means is now available for the study of direct amoebicidal action *in vitro*.

J. D. Fulton

PLOYÉ, M. Considérations chirurgicales sur l'amibiase iléo-caecale. [**Surgical Aspects of Ileo-Caecal Amoebiasis**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 625–31.

Ileo-caecal amoeboma has to be distinguished from cancer and from ileo-caecal tuberculosis, but other types of granuloma are sometimes met with in this region. The author cites the case of a patient who was admitted to hospital two months after an operation for acute appendicitis, with redness and swelling of the operation scar, unaccompanied by fever or pain. During exploration, yellowish granulation tissue was found infiltrating the skin, and almost immediately the lumen of the adherent caecum was entered. A portion of granulation tissue was taken for biopsy and the wound was left to granulate. The fistula closed rapidly, but the tumour increased in size until it filled the whole iliac fossa. The pathological report on the tissue removed at the original operation showed that it consisted only of inflamed connective tissue, with no trace of the appendix. The patient's general condition remained satisfactory, no parasites were found in the stools, the guineapig test carried out with the tissues removed for biopsy was negative, and there was no enlargement of the lymph nodes. The agglutination reaction for *Actinomyces* was positive 1/200 and the

complement deviation reaction was also positive. Treatment by iodide of potassium and injections of lipiodol (this was in 1931) resulted in complete cure.

The clinical characters of this tumour are its hardness, fixity to skin and surrounding tissues, absence of lymph node involvement, invasion and violet discolouration of skin, whereas in amoebic and tuberculous affections of the caecum the skin is usually thinned and mobile on the tumour, which is nodulated and more easily defined. Crohn's disease and sarcoma of the ilium must be borne in mind, but usually the diagnosis lies between amoebic typhlitis simulating appendicitis and true appendicitis complicated by the presence of amoebic typhlitis ; operation in the former condition carries a high mortality. Painful enlargement of the liver is a valuable indication that the condition is amoebic, and defensive rigidity of the abdominal wall on palpation permits of the diffuse typhlitis of amoebiasis being distinguished from the more localized signs in appendicitis. The diagnosis of appendicitis having been made, appendicectomy is indicated, even though there is concomitant amoebiasis. In such cases the appendix is often retrocaecal and buried amidst peritoneal adhesions, from which it must be shelled out by gauze dissection. To operate by mistake on a case of caecal amoebiasis is less risky than to delay operation in a case of true appendicitis.

When medical treatment has failed to resolve an ileo-caecal amoeboma, the author advises that a small lateral ileostomy should be established, to allow of the introduction of antibiotics or other medicaments into the caecum, a procedure which carries less risk of cutaneous amoebiasis than appendicostomy or caecostomy. Should this fail, complete ileostomy, with transection of the gut, should be performed to put the large intestine at rest ; after cure of the dysentery continuity of the bowel is re-established. A more severe measure is right hemicolectomy with ileo-transversostomy, now usually practised in one stage, thanks to antibiotics. The same operation may be used in the case of an irreducible intussusception of an amoeboma. Intestinal obstruction from an amoeboma is rare and is best dealt with by a temporary lateral ileostomy, followed if necessary by ileo-colostomy after relief of the acute symptoms. Perforation of a dysenteric ulcer in the large intestine may be open with general peritonitis, or may form a local abscess ; in the latter case simple incision with the minimum of interference is all that is necessary, in the former laparotomy with drainage by the Mikulicz method, without any attempt to suture the perforation, is the line of treatment recommended by the author, based on his experience with typhoid ulcers which have perforated, though he has not had the opportunity of trying the method in the case of perforated amoebic ulcers. *W. L. Harnett*

Kilgore, N. A., Jr. **Pleuropulmonary Amebiasis.** *Southern Med. J.* 1951, Dec., v. 44, No. 12, 1093–5. Discussion [Abstract] 1095–6.

A short general paper.

Bhoumik, A. **Amoebic Infection of the Female Genital Organs with Report of a Case.** *Indian Med. Gaz.* 1951, Aug., v. 86, No. 8, 355–7, 1 fig. [11 refs.]

Entamoeba histolytica infection of the female genitalia has only infrequently been recorded. This paper is a report of a case of amoebic ulceration of the vagina of a multiparous Hindu woman. The condition resolved under emetine treatment given parenterally, and "enteroquinol" [constitution unstated] given orally and by intra-vaginal insufflation. There follows a review of the literature on amoebiasis of the female genitalia and its mode of causation. It is suggested that amoebic vaginitis is not so rare as the scanty records would suggest it to be [see also this *Bulletin*, 1949, v. 46, 742]. *A. R. D. Adams*

WILKINSON, J. **Chloroquine in Extra-Intestinal Amoebiasis.** *East African Med. J.* 1951, Dec., v. 28, No. 12, 492–7. [31 refs.]

A general review.

ROOVERS, J. J. C. P. A. & VAN STEENIS, P. B. **Treatment of Hepatic Abscess with Chloroquine.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Dec., v. 3, No. 4, 333–42, 1 graph.

After some general [and very sound] observations on the aetiology and pathology of amoebic liver infections, and the effect of drugs on intraluminal, intestinal, and extra-intestinal amoebic infections, the authors turn to a consideration of the use of chloroquine in hepatic amoebiasis. Though, *in vitro*, chloroquine is much less effectively amoebicidal than are the alkaloids emetine and conessine, its activity is rather greater than that of chiniofon, stovarsol, and carbarsone. Pharmacological studies have shown that chloroquine concentrates in the liver to an extent 200 times greater than in blood serum ; and in practice chloroquine has proved most effective in the treatment of hepatic amoebiasis.

Case histories of 4 patients suffering from amoebiasis with liver involvement, and the satisfactory results following treatment of the latter with chloroquine, are given in some detail. The explanation of relapses of amoebiasis of the liver which may follow emetine treatment is thought to be the presence of a residual focus of liver infection after the treatment, or else to the development of emetine resistance by the parasites. The importance of sterilizing the intestinal infection by suitable medication, after the liver abscess has cleared, is stressed.

In a discussion following the paper WIELENGA reported unfavourably on the results of treatment with chloroquine of 10 of his patients suffering from amoebic liver abscesses. Van Steenis suggested that as such unfavourable results had not so far been reported in the literature it would be desirable to record these. UTERMÖHLEN said that when emetine was first used for amoebic dysentery the dose was minimal and when it was increased there were toxic complications, such as temporary palsies ; but van Steenis replied that the original recommendation made by ROGERS as to the dosage was that still used, and it was very remarkable that it had proved so correct and had not needed modification. *A. R. D. Adams*

SHERRY, S., MCCARTY, W. R. & TILLETT, W. S. **Rationale of Therapeutic Use of Streptokinase-Streptodornase in Amebic Abscess of Liver.** *Arch. Intern. Med.* 1951, Dec., v. 88, No. 6, 752–9, 5 figs. [Refs. in footnotes.]

Local applications or instillation of streptococcal enzymatic solutions, containing streptococcal fibrolysin (streptokinase) and streptococcal desoxyribose nuclease (streptodornase), have been shown to lyse fibrinous and purulent exudates. The physical characteristics of the exudate in an amoebic liver abscess are the coarse, viscous and clumpy nature of the anchovy paste material, which in a case of amoebic liver abscess recorded was shown to be composed largely of extracellular desoxyribo-nucleoprotein, probably derived chiefly from the nuclei of the destroyed hepatic cells. *In vitro* experiments showed that material aspirated from the abscess cavity of this patient was immediately progressively thinned when incubated with added streptokinase and streptodornase, but not with added isotonic saline or with crystalline trypsin.

Accordingly, in conjunction with oral chloroquine and terramycin treatment, two plastic catheters were inserted under local anaesthesia into the liver abscess cavity. One of these was for the purpose of repeated instillation of streptokinase-streptodornase and saline irrigation of the cavity, and the other for withdrawal

of the exudate. The exudate thinned within a few hours as a result of the treatment, and the size of the cavity rapidly diminished ; drainage from it completely ceased within 4 days, and the catheters were then removed. All local and general signs of the disease vanished, and the patient was discharged after further treatment for his bowel infection, apparently cured.

The technique proved most satisfactory ; in view of its rational nature it is considered to be worthy of further and more general employment in the treatment of amoebic liver abscesses. *A. R. D. Adams*

Osbond, J. M. **Chemical Constitution and Amoebicidal Action. Part I. Synthesis of α-Tetrahydro*iso*quinolino-ω-tetrahydro-l-*iso*quinolylalkanes related to Emetine.** *J. Chem. Soc.* 1951, Dec., 3464–75.

Sutliff, W. D., Green, F. D. & Suter, L. S. *Endamoeba gingivalis* **in Pulmonary Suppuration.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 718–23, 2 figs.

Entamoeba gingivalis has been found in purulent material from the lungs of two recently seen cases of pulmonary suppuration. *E. gingivalis* was the first parasitic amoeba of man to be found, Gros (1849) recording its presence in the soft tartar of teeth. It was subsequently described in detail by Prowazek (1904). No cystic stage of the organism is known ; morphologically, the amoebae of this species much resemble those of *E. histolytica*, but for the fact that they often contain refractile ingested masses lying in vacuoles which give them such a striking and characteristic appearance that they can readily be differentiated from the latter. There is no evidence that *E. gingivalis* causes pyorrhoea, dental caries, tonsillitis or any other pathological changes. The authors have found in the literature no previous records of an *E. gingivalis* infection of the bronchi or lungs.

In the two cases described, one a 30-year-old white woman, and the other a 26-year-old coloured man, the patients suffered from cough with profuse expectoration. The first patient had 18 months earlier been in hospital and had been successfully treated with emetine and chiniofon for a pulmonary amoebic abscess. On the occasion of this second examination it was found that she was suffering from suppurative bronchiectasis. *E. gingivalis* was present in considerable numbers in specimens of bronchial exudate obtained by bronchoscopy. No protozoal infection of the bowel was apparent on stool examination.

The second patient suffered from pulmonary suppuration due to sarcoidosis and emphysema. *E. gingivalis* was found in the profuse purulent sputum ; there was no evidence of a mouth infection with the parasite. No protozoal infection of the bowel was revealed by examination of the stools.

These cases illustrate the ease with which a mistaken diagnosis of pulmonary amoebiasis may be made. A report of an *E. histolytica* infection of the lungs should be cautiously received in the absence of proof of this infection elsewhere ; the mere discovery of amoebae in the sputum does not establish it. The amoebae must specifically be identified. The characteristic features of *E. gingivalis*, the food vacuoles and refractile phagocytosed bodies, can most effectively be recognized after staining with iron haematoxylin.

A. R. D. Adams

Urso, B. Su un nuovo metodo di colorazione della Lamblia nelle feci. [**New Staining Method for** *Giardia* **in Faeces**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Jan., v. 32, No. 1, 3–5. English summary (2 lines).

The author recommends the following method for staining *Giardia* in faeces. A 0·46 gm. tablet of Abbott's acriflavine is dissolved in 10 cc. saline, and the

solution is allowed to mature for 5 days, after which it is filtered through paper, and a sample of faeces is teased up in several drops of solution. In this preparation the flagellates soon become immobilized and stain yellow, revealing their morphology. The cysts stain similarly, showing the nuclei and their internal structure. The surrounding microscopic field acquires an intense yellow colour. When kept in a stoppered bottle, the staining solution remains unchanged for months. *C. A. Hoare*

Germain, A. & Cluzel, P. Syndrome de Loeffler pleural et lambliase. [**Loeffler's Syndrome and Giardiasis**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1951, Nos. 29/30, 1235–7.

This report relates to a maritime electrician of 19 years, who had never been in the tropics and who was found to be suffering from Loeffler's syndrome. No *Ascaris* were found in the stools and although *Trichuris* eggs were found, it is not considered that they acted as allergens. On the other hand, *Giardia* cysts were found in the stools and vegetative forms in the bile. The patient was treated with nivaquine by mouth and intraduodenal instillation of mepacrine. The parasites disappeared and the lung condition cleared up in 12 days.

It is suggested that the *Giardia* might have been responsible for the allergic condition. *H. J. O'D. Burke-Gaffney*

McVay, L. V., Jr., Evans, L. & Sprunt, D. H. **Aureomycin in Male Trichomoniasis.** *Southern Med. J.* 1951, Dec., v. 44, No. 12, 1122–5. [14 refs.]

The prevalence of *Trichomonas vaginalis* infection in women is now fully recognized. For many years its occasional occurrence in males has been recorded; during the last 10 years there have been statements by several American workers that it is not rare but very prevalent in males. It has been suggested that as it causes symptoms it should be regarded as a seventh venereal disease. The authors state that a *Trichomonas* infection may involve only the male urethra, or that it may extend to the bladder, the prostate, the seminal vesicles, and the renal pelves. No satisfactory or specific treatment for the infection has hitherto been found.

Eleven male patients suffering from a urethral discharge considered to be due to a *Tr. vaginalis* infection were treated orally with aureomycin. The records of 4 illustrative cases are presented in detail. The dosage of aureomycin employed for those suffering solely from urethral involvement was 3 gm. daily for three days and then 2 gm. daily for four days; when the prostate and seminal vesicles appeared to be involved the daily 2 gm. dose was continued for an additional three days.

Prostatitis, seminal vesiculitis, and all other symptoms and signs of trichomoniasis in every one of the 11 cases rapidly vanished as a result of aureomycin treatment. There was no recurrence over periods of observation ranging from 1 to 10 months except in a single case; in this the parasites reappeared within three weeks. *A. R. D. Adams*

Meira, J. A. & Corrêa, M. O. A. Isosporose humana. Considerações sôbre 28 casos. [**Human Isosporosis**] *Rev. Inst. Adolfo Lutz.* São Paulo. 1950, v. 10, No. 1, 117–39, 12 figs. on 2 pls. [55 refs.] English summary.

Between 1942 and 1950 the authors examined in São Paulo up to 23,000 human stools, 28 of which revealed infections with coccidia of the genus *Isospora*. In 13 of these cases unsegmented oöcysts, which completed their

sporogony *in vitro*, were passed. These oöcysts conformed in appearance and measurements to *I. belli*. In the stools of the remaining 15 cases the majority of the parasites were represented by isolated mature sporocysts, but in some cases two sporocysts were united by a delicate oöcystic membrane. These sporocysts measured from 10 to 18 μ in length and 7·5 to 12 μ in breadth, and on the average 14·8×9·8 μ. This coccidium thus differed from *I. belli* in the mature state of the sporocysts when discharged, in their dimensions, and in the presence of an easily ruptured thin oöcystic membrane instead of a hard oöcyst wall. Since these characters correspond to those described for *I. hominis* (and *I. bigemina* of the dog), the authors conclude that man may be infected with two species of *Isospora*, *I. belli* and *I. hominis*. Whether or not the last-named is identical with the canine species remains an open question.

As regards the course of human coccidiosis, there was no evidence of any symptoms attributable to *I. hominis*, whereas infections with *I. belli* produced in some cases enteritis, in others there were no clinical manifestations, while in some cases gastrointestinal disorders might have been due to other parasites.

[There has been a long-standing controversy regarding the identity or distinctness of the two species of human *Isospora*, with the resulting confusion in nomenclature, the unicists referring to the parasite as *I. hominis*, while the dualists recognize *I. belli* as well. The present authors have provided the strongest quantitative evidence in favour of the existence of two species, thus supporting the views of WENYON (this *Bulletin*, 1923, v. 20, 785), REICHENOW (*ibid.*, 1925, v. 22, 843) and the reviewer (*ibid.*, 1950, v. 47, 575).]

C. A. Hoare

YAWS

APTED, I. **Bismuth Salicylate in the Treatment of Yaws.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 389–92.

Reference is made to an earlier paper by APTED, HARDING and GOSDEN [this *Bulletin*, 1948, v. 45, 1089] in which it was hoped that 5 injections of bismuth salicylate at intervals of 5–7 days would prove to be effective treatment for yaws. The bismuth salicylate was suspended in arachis oil, and of this 2 cc., containing 0·25 gm., was the single dose for an adult weighing more than 120 pounds (54 kgm.).

In August 1950 in Sierra Leone, 406 patients were examined exactly 2 years after having received the above course in full. On the sera from 236 the Kahn reactions were carried out.

Clinical examination of the 406 patients showed that 17 per cent. had active [probably secondary] lesions, 31 per cent. had inactive painless plantar lesions, 27 per cent. had slight plantar irregularities and 25 per cent. had no lesions. Thus, it might be considered that 52 per cent. were " clinically cured ". On the other hand, infectious cases could not have exceeded 17 per cent. The results in the 236 sera examined gave Kahn ± or — in 0, 17 per cent., 28 per cent., 36 per cent. respectively in these four groups above. Of all four groups 42 per cent. gave serum Kahn reactions 4+ to 3+ and 37 per cent. gave 2+ to 1+. These results were inferior both clinically and serologically to those following acetylarsan (diethylamine acetarsal) with or without bismuth [*loc. cit.*].

The Jamaica Yaws Commission [this *Bulletin*, 1937, v. 34, 959] reported 60 per cent. serological reversal 2½ years after treatment with bismuth salicylate suspension [18 months after 5 injections of similar doses].

The author, however, says that bismuth salicylate still plays an important part in mass treatment in Sierra Leone where the intention is to reduce yaws incidence to a low endemic level, at which no serious suffering is caused. "To attempt to do more than this, by too intensive a campaign, may not only invite the advance of syphilis as the yaws retreats, but may also prepare the ground for a serious epidemic of infectious yaws." [No evidence is given to support the possible advance of syphilis.]

The author says that to render infectious patients non-infectious acetylarsan is the drug of choice, but in the mass treatment of the vast numbers in Sierra Leone with non-infectious plantar lesions bismuth salicylate is adequate. At the numerous permanent yaws treatment centres the further treatment occasionally required is readily available.

After the above study the dose of bismuth salicylate suspension was increased to 2 cc. for a patient weighing 100 lb. (45 kgm.).

[In the second-last paragraph the reference to Table I as "17" should be "17 per cent.".] *C. J. Hackett*

LEPROSY

Joulia, P., Petges, G. & Texier. Un cas de maladie de Hansen de contamination autochtone. [**A Case of Leprosy due to Autochthonous Contagion**] *J. Méd. de Bordeaux.* 1951, Dec., v. 128, No. 12, 1098–9.

This was a case of lepromatous leprosy in a chambermaid who had never been in an endemic country. It is thought that she must have acquired the disease through a client at the hotel at which she was serving. At this hotel near the wharf in Bordeaux passengers from the ships often stayed, and one of these might have been suffering from leprosy without being recognized as such. *Ernest Muir*

Abbott, P. H. **Observations on Leprosy among the Azande of the Southern Sudan.** *East African Med. J.* 1951, Dec., v. 28, No. 12, 503–7.

Previous reports have been made on the Azande and the control of leprosy in the Southern Sudan by Cruickshank (*Leprosy Review*, 1932, v. 3, 3), Woodman [this *Bulletin*, 1938, v. 35, 295], Bloss [*ibid.*, 1946, v. 43, 656], and Abbott [*ibid.*, 1950, v. 47, 652]. Judging from the figures given by these and the investigations by the present author, the incidence does not seem to have diminished during the last 20 years. The control of leprosy in this region has been tied up with that of sleeping sickness, occasion being taken to inspect for the two diseases at the same time. "If the disease has progressed to what is considered an infectious stage, the patient is admitted to the segregation settlement at Li Rangu". So far the treatment has consisted of chaulmoogra injections, and the "Azande are loathe to receive full and adequate doses at proper intervals". However, now that DDS has been introduced, better results are hoped for.

A recent careful sample survey of 17 sub-chiefships taken at random and including a population of 9,410 disclosed 436 cases, an incidence of 46·3 per thousand. A remarkable statement is that there were 280 females and 156 males (the reverse of the usual findings elsewhere). Of these patients "eighty per cent. were of a mild neural type showing either tuberculoid lesions (forty-six per cent.) or simple macules (thirty-four per cent.) without neuropathic disability. Five per cent. suffered from lepromatous leprosy and were segregated

and fifteen per cent. suffered from more severe and crippling grade of neural leprosy." The absence of better results is imputed not to the method of control chosen, but to the impossibility of carrying it out thoroughly for want of adequate staff and resources. These being limited, it is considered better to concentrate first on improving the standard of living and the general condition of the people in the hope that under better circumstances leprosy will gradually diminish. Moreover the mild type of the disease in 80 per cent. of the patients indicates that leprosy is not such a serious handicap as the incidence of 46·3 per thousand might indicate. *Ernest Muir*

WHEATE, H. W. **Leprosy in Teso District, Uganda.** *East African Med. J.* 1951, Oct., v. 28, No. 10, 420–22.

In this short three-page report there is much matter of interest. Five locations are reported on with an approximate population of 5,800, of whom 3,643 were seen. Among these, 173 cases of leprosy were found, of which 150 (over 86 per cent.) were classified as tuberculoid, and only 11 (just over 6 per cent.) lepromatous, none of the latter being in children. Dr. Wheate, however, considers that some of the lepromatous persons absented themselves from the survey because of a mistaken idea that they would be forcibly segregated. Also those of age-groups between 16 and 25 absented themselves fearing that their recognition might interfere with marriage prospects ; thus there were 23 in the 11–15 group, and 27 in the 26–30 group, but only 4 and 15 respectively in the two intermediate groups. The incidence was found to be highest in the areas with highest humidity associated with increased density of population. " A history of familial contact is frequent but not invariable. The Teso custom of frequent beer parties, to which all neighbours, even those suffering from lepromatous leprosy, are invited and sleep off the effects of their indulgence in their host's hut—with his children—is considered to be the most common source of extra-familial contact." There was no evidence for associating leprosy with malnutrition in childhood or with other diseases or " least of all with a low standard of personal hygiene ". The estimated number of cases of leprosy in the Kumi County is 3,000, of which about 200 are of the lepromatous type, the total population being approximately 70,000. *Ernest Muir*

BOENJAMIN, R. **Leprosy and Antileprosy Activities in Indonesia.** *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 277–82, 1 fig.

Leprosy in Indonesia is an even greater problem than it was before the war. In a population of 75 millions there are 22,000 known cases, 3,735 of which are segregated in 40 institutions. There are only 3 doctors engaged in leprosy work as compared to 13 before the war. In the capital, Djakarta, there are 1,500 known cases ; some of these are treated as in-patients in 2 institutions and others as out-patients. At least 10 specialists are required, and it is suggested that physicians interested in leprosy might be invited from other countries for one-year periods, which would be to mutual advantage.

Ernest Muir

HOWIE, J. **Lepromatous Leprosy affecting a Recent Canadian Immigrant.** *Canadian J. Pub. Health.* 1951, Nov., v. 42, No. 11, 460–66.

A patient suffering from leprosy arrived in Canada from Malta. He had been working 7 months and then been another 3 months unable to work before he was examined medically. He was first supposed to be suffering from syphilis, but later leprosy was diagnosed by the author, who had seen other cases in

India. All contacts were examined, but showed no symptoms of the disease. [The length of the pre-symptom period of leprosy, generally more than 10 months, is not mentioned.] The type was found to be lepromatous, and the patient admitted that he had relatives in Malta with the disease. Although at the time of examination he was a typical case, he had managed to pass all medical examinations in Malta, in New York where he first landed, and on entering Canada.

In Canada " ' An Act respecting Leprosy ' has been passed by the Dominion Government. This Federal Act requires that all cases of leprosy shall be admitted to one of the two leprosaria " in British Columbia and New Brunswick. The patient was accordingly sent to the latter and put on treatment with diasone. The author remarks however " some more economical form of the sulphones . . . . . would appear to be a necessity to ensure its use in lands where living standards are low ". [He had apparently not heard of DDS.]

Ernest Muir

Floch, H. La lèpre au bagne Guyanais son évolution durant un siècle (1852–1950) ses particularités. [**The Evolution of, and Details of, Leprosy in the Convicts' Prison in Guiana during the Century from 1852 to 1950**] *Internat. J. Leprosy*. New Orleans. 1951, July–Sept., v. 19, No. 3, 283–95. [17 refs.]

This is similar to a report already abstracted [this *Bulletin*, 1952, v. 49, 154]. The period from 1939 onwards is reviewed. During 11½ years 193 cases have been reported in a penal population averaging 4,204, a prevalence of 4·6 per cent. and an annual incidence of 4 per 1,000. The question of para-immunity to leprosy due to the presence of the tubercle bacillus is discussed.

Ernest Muir

Risi, J. B. Da assistência dispensarial e o armamento antileprótico no Brasil. [**The Antileprosy Dispensary Service and Campaign in Brazil**] *Rev. Brasileira Leprologia*. S. Paulo. 1951, June, v. 19, No. 2, 61–9.

This is a very frank and thorough discussion of the leprosy problem in Brazil and of the meagre success which has attended efforts that have been made to meet it in the last 10 years. In the 25 federated states of Brazil there are 36 residential institutions for leprosy patients. There are also 85 dispensaries for the control and treatment of leprosy, of which 22 are in the State of São Paulo, 9 in Espírito Santo, 7 in Minas Gerais, 8 in Distrito Federal and 5 in Rio de Janeiro. The distribution of these dispensaries does not correspond with the distribution of leprosy, as there are only 8 in Norte (North) where the coefficient of prevalence is 3·75 per thousand, and 32 in L'este (East) where the coefficient is 1·09 per thousand. In 1946, 20,000 contacts were examined and the total number of known cases was 45,101, while in 1950 the number of contacts examined was 35,160 and the number of known patients was 61,191. During that quinquenium the average yearly number of cases found among the contacts examined was 1·5 per cent. During the last 10 years, 11,000 new patients have been recruited. During that period the average annual increase of population in Brazil was 1,140,000. Of the whole population it is calculated that at least one per 1,000 have leprosy.

The two chief reasons given for the lack of success in controlling leprosy are : the scarcity of dispensaries, many of which are little more than registering stations ; and the difficulty in obtaining efficient personnel, the cause of the latter being partly insufficient pay to attract suitable persons to this type of work.

Ernest Muir

Quagliato, R. Algumas considerações epidemiológicas em relação ao censo de 1940 e os casos registrados no D.P.L. do Estado de São Paulo. [**Some Epidemiological Considerations in Relation to the 1940 Census and the Cases Registered in the D.P.L. of the State of São Paulo**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, Sept., v. 19, No. 3, 139–60.

This is a statistical study of the patients with leprosy in the State of São Paulo as found in the census of 1940 and in the records of the D.P.L. (Department for the Prophylaxis of Leprosy). The original hypothesis was that leprosy was most common in Italian immigrants and in their children, and that possibly these were particularly susceptible to leprosy. In this study the total population of 7,180,316 is first analysed and then the leprosy patients are divided according to nationality, colour, sex, profession and age at onset of the disease. Brazilians form 88·1 per cent. of the population and about 80 per cent. of the patients. Italians formed 8·7 per cent. of the population in 1920 and in 1940 only 3·2 per cent., while in the latter year they contributed 10 per cent. of the leprosy cases. The latter figure of course takes no account of those who have become Brazilian citizens since 1920. Classifying by colour, 84 per cent. of the population were white, but 91 per cent. of the leprosy patients were white. It is questioned whether this is due to racial susceptibility or to greater facility for diagnosis. The whole article is well worthy studying, but difficult to abstract. *Ernest Muir*

de Souza, A. R. Fenômeno de Sanarelli-Schwartzman—a propósito da lepra de Lúcio. [**The Phenomenon of Sanarelli-Shwartzman in Connexion with the Leprosy of Lucio**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, Sept., v. 19, No. 3, 161–5.

The author describes a case of leprosy with severe reaction and the formation of many small abscesses which burst, discharging blood and pus. The bacteriological examination was at first strongly positive for lepra bacilli, but after 3 years' treatment with diasone and diamidin it became negative. The author considers this to be one of the " Lucio " form of leprosy, but he propounds a theory that the cause of this form corresponds to the " Sanarelli-Shwartzman Phenomenon " in which, if a sublethal dose of cholera vibrios is injected in an experimental animal and followed the next day by a minute dose of cholera or *Proteus* culture intravenously, diffuse haemorrhagic lesions are produced.
Ernest Muir

Gallego Burín, M. Aportación al estudio de la imagen capilar en el leproso. [**Results of the Study of the Capillary Picture in Leprosy**] *Rev. Ibérica de Parasitología.* 1950, Oct., v. 10, No. 4, 427–64, 7 figs. & 4 pls. [68 refs.] English summary.

A study is made of the skin of 25 leprosy patients and the changes from the normal of the profile appearances of the capillaries. After a review of the work of other authors that of Jaensch is accepted as giving the best normal appearances with which to make comparisons. Taking this as a standard, the author finds 100 per cent. of differences in the capillary profiles in his 25 cases. It was impossible to judge the advance of the disease by the appearances. There were changes in the number and size of the blood vessels, the greatest alterations being in the veins. The article is illustrated with numerous sketches of the various appearances of the capillaries. *Ernest Muir*

BARNETSON, J. **Pathogenesis of Bone Changes in Neural Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 297–307. [54 refs.]

The possible causes of the bone changes in neural leprosy are discussed. Among these are vascular conditions, trophic changes due to interstitial neuritis, calcium deficiency and other changes in blood chemistry [see also this *Bulletin*, 1950, v. 47, 756]. The importance of changes in the blood supply to the bones has been frequently stressed. A study of bone changes seen radiologically shows minute nicks first occurring on the distal margins of the terminal phalanges. The " tuft " (distal margin) becomes frayed and then disappears, leaving only the base and a part of the shaft. These changes take place without periosteal reaction, osteosclerosis or sequestrum-formation, unless there is secondary infection. The gaps in the bone are found to be replaced with fibrous tissue.

The author divides the bone changes into two categories, primary and secondary. The primary is due to destruction of vasomotor fibres so that the blood channels lose their power to accommodate themselves to continual variations in the circumstances of the tissues. " Changes in metabolism and in the amount of work done, changes evoked by trauma or by alteration of environment—these and many others require rapid and sometimes prolonged variations in the flow of blood to the tissue." The degree of loss of vasomotor control depends on the degree of destruction of vasomotor fibres by the neuritis. Bone atrophy is caused in other diseases by alteration of blood flow, as by hyperaemia in Südeck's atrophy, and by ischaemia in senile atherosclerosis, thromboangitis obliterans, scleroderma and Raynaud's disease. The lack of symmetry in bilateral lesions is due to chance involvement of some and sparing of other vasomotor nerve fibres by bilateral leprous neuritis.

The secondary bone changes are dependent on multiple small injuries due to anaesthesia, muscular atrophy, fixed joints, disuse of limbs, etc. The hyperaemia caused by prolonged inflammation of the surrounding soft tissues, even when there is no secondary infection of the bone itself, is another cause given of thinning of the bone shaft. [No mention is made of the bone deformities sometimes found in lepromatous cases where there is shortening of the phalanges without any marked anaesthesia, wasting of the small muscles or contractures, a condition apparently due to lepromatous invasion of the phalanges by *Myco. leprae.*] *Ernest Muir*

DE FARIA, J. L. Estudo da reação à lepromina (Mitsuda) em cães. Histopatologia. Significação. [**Lepromin Reaction in Dogs. Histopathology and Significance**] 190 pp., 53 figs. on pls. [210 refs.] English summary. 1951. Rio de Janeiro : Departamento de Imprensa Nacional.

This is a repetition of the experiments by WADE in 1941 [this *Bulletin*, 1941, v. 38, 703]. In the first part of the paper the Mitsuda test is discussed. In the second part the author reports his own experiments with dogs. Ten dogs were inoculated with an antigen composed of a suspension of leproma. At the same time he inoculated a suspension of normal skin as a control. The initial dermic papule appeared at the site of inoculation, but, except in 2 dogs, it disappeared within 48 hours. All the dogs gave a late reaction after 7 to 21 days. In the initial papule there was histologically an acute reaction with invasion of phagocytic cells, chiefly neutrophiles. During the latent period the cellular infiltration chiefly showed histiocytes and monocytes, which gradually organized themselves into nodules of tuberculoid structure. Bacilli were still to be found up to 35 days after the injection. Epithelioid cells were seen until the 94th reaction day.

The author agrees with Wade that the reaction in the first 24 hours is not specific. He disagrees with Wade in his considering that the nodule formation depends on the natural resistance to foreign matter, and not on allergy. The afflux of neutrophiles is due to irritating substances from the bacilli. In animals in which no nodule forms, this is because they can eliminate the injected bacilli without forming an outwardly perceptible nodule. He thinks that when an attempt is made to inoculate animals with leprosy dead bacilli should also be injected as controls. *Ernest Muir*

Dubois, A. & Rademecker, M. A. Valeur de la chronaxie comme méthode de diagnostic précoce des formes nerveuses de la lèpre. [**The Value of Chronaxy as an Early Diagnostic Method in the Nerve Forms of Leprosy**] Reprinted from *Rev. Belge Path. et Méd. Expér.* 1951, Sept., v. 21, No. 1, 108–18. [15 refs.]

Exploration of the literature gave very little information as to increased chronaxy in leprosy. Examination of 5 cases by the authors gave some important findings. Jeanselme and Huet had considered that electrical changes corresponded with muscular atrophy, but not with thickening of nerves ; but in the authors' observations there were electric changes present in regions where there was no wasting of the muscles and no palpable thickening of the nerves. The fact that the chronaxy is altered in regions without signs of cutaneous or neural involvement may indicate that the nerves are affected for a period of time before nerve thickening is perceptible to the finger. It is suggested that the examination of chronaxies may be used for the early diagnosis of cases before definite clinical changes have appeared. It would also be interesting to ascertain whether these changes still persisted in healed cases. A third possible use of this method would be to find out whether there was a tendency towards generalization of bacilli from definite lesions. The 5 cases examined by the authors were comparatively advanced ; they suggest application of the method to early cases.

[A combination of this method with Khanolkar's method of histological examination of fine nerve branches might give interesting results. See this *Bulletin*, 1952, v. 49, 56.] *Ernest Muir*

Dubois, A. A propos du diagnostic de la lèpre. La chronaxie. [**Chronaxy in Relation to the Diagnosis of Leprosy**] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 525–9.

This paper is in continuation of the above. After a summary of the previous paper another case in an earlier stage of the disease is reported on. Electrical examination of this case confirmed the presence of extended chronaxy in regions outside the area of the clinically perceptible lesions, thus confirming the previous findings in the other 5 cases. *Ernest Muir*

Olmos Castro, N. & Bonatti, A. A. **Contribution to the Study of the Serology of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 309–21, 2 figs.

An antigen is prepared by extracting lepromatous tissue with chloroform, evaporating and, after discarding the ether-soluble portion, making a 1 per cent. solution of the remainder in 95 per cent. alcohol. With this lipid antigen either a flocculation or a complement-fixation test may be done, though for its simplicity and ease the former is preferred. In 162 lepromatous cases 73·5 per cent. were positive ; in 62 tuberculoid cases 4·8 per cent. were positive ; in 106

contacts with leprosy 3·7 per cent. were positive. The percentages of positives in 1,108 healthy people, 140 with syphilis, 120 with pulmonary tuberculosis, 65 with parasitosis, and 53 with other diseases, were respectively 0·2, 1·8, 0·8, 0·0, and 0·0.

When the test was used quantitively in 18 lepromatous cases the titre varied from 1,024 to 0 ; in 7 indeterminate cases the titre was 1 in four and negative in three, while it was negative in two tuberculoid cases. The authors end with the statement that " The concordance between the state of infection and serological results leads us to believe that serology may be utilized as a valuable factor in decisions for the granting of conditional parole to patients with the lepromatous form of leprosy ". *Ernest Muir*

Schmid, E. E. & Thillainathan, P. **Alteration of Paraluic Seroreactions in Leprosy.** *Ceylon J. Med. Sci.* (Sect. D.) 1951, Mar., v. 8, Pt. 1, 51–6, 1 fig. [10 refs.]

In all, 479 leprosy patients were taken for examination. In serological tests with three techniques, Wassermann, Kahn and Kline, all but 154 gave negative results with all techniques. The Kahn Verification Test was done on these 154 cases. With the original sero-reactions, clinical evidence and the Kahn Verification Test as standards, it was calculated that only 6 out of the 154 were proved to be syphilitic. In all others the sero-reactions were considered to be " paraluic ". It was found that as in syphilitic sera so also in paraluic sera there was a tendency for the reaction of stored sera to change with the passing of time. *Ernest Muir*

Koenigstein, R. P. & Chang, S. T. **Colloidal Gold Reaction in the Spinal Fluid in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 323–6.

This reaction was tested out in the hope that it would form a method of distinguishing between paralytics of leprous and those of syphilitic origin. It was found, however, that the gold reaction in the spinal fluid was positive in 11 out of 15 cases of leprosy without coincident syphilitic infection. The authors do not attempt to give any reason for the observed changes in the spinal fluid of leprosy patients, but think it is most probably due to leprosy itself.
Ernest Muir

Cochrane, R. G. **Classification of Leprosy.** [Editorial.] *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 337–44. [12 refs.]

This is a suggested modification of the South American classification of leprosy and of its modification as accepted at the 1948 International Congress in Havana. The author accepts the two main types of leprosy, lepromatous and tuberculoid, though he would prefer the term " lepride " for the latter. But he objects to the Indeterminate or Uncharacteristic group as confusing, seeing that it includes 5 different kinds of cases, those with resolved tuberculoid lesions, resolved leproma, early maculo-anaesthetic lesions, pre-lepromatous macules, and resolved atypical or dimorphous lesions. These should be attached to the two main groups according to whether they have (*a*) a leproma-like histology and a negative or almost negative Mitsuda reaction, or (*b*) a tuberculoid-like histology and a moderately or strongly positive Mitsuda reaction. The author considers that the term " tuberculoid " should be confined to cases with a more than slightly positive Mitsuda, in which the histological picture shows that the granuloma is continuous up to the epithelium without a subepithelial band

comparatively free from granuloma. Such cases do not lose their Mitsuda-positivity or change into the lepromatous form. The term tuberculoid has been wrongly given to cases other than these which, though histologically they may show epithelioid and giant cells, yet lack the essential tuberculoid characteristics and should be classified as lepromatous with a subclassification of intermediate, border-line, or dimorphous.

The following classification and subclassification is suggested :

Lepromatous Leprosy	*Tuberculoid (Lepride)*
Preleproma (pl)	Maculo-anaesthetic (Tm)
Macular leproma (Lm)	Minor lepride (Te)
Diffuse leproma (Ld)	Major lepride (TE)
Infiltrative leproma (Li)	Polyneuritic (Tp)
Nodular leproma (Ln)	
Polyneuritic (Lp)	

A suggestion is made that " if the word dimorphous is not acceptable, could not the intermediate group of the Cuba classification refer to the dimorphous lesions ? These are truly indeterminate and may change." In distinguishing early doubtful tuberculoid and lepromatous cases reference is made to the histological work of KHANOLKAR [see this *Bulletin*, 1952, v. 49, 56] and his findings with regard to the neurotropic nature of the leprosy bacillus. [It is not made clear how such intricate methods as those used by Khanolkar can be made generally available except in a few centres where there is adequate equipment and trained personnel. Any classification to be adopted universally must be capable of universal application and within the resources available to all physicians dealing with leprosy.] *Ernest Muir*

ROBLEDO, J. L. La lepra y el cuero cabelludo. [**Leprosy in the Hairy Scalp**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, June, v. 19, No. 2, 117–26, 2 pls.

A theory is put forward that leprosy is a disease of the lymphatics and that on that account it does not affect the scalp. [This is not the case, as is now well known.] The author goes on to suggest that the leprosy bacillus might be cultivated at a low temperature in the lymph of a child of leprous parents with a negative lepromin test. [While the reasoning is difficult to follow, the suggestion is worthy of consideration.] *Ernest Muir*

KELLERSBERGER, E. R. & RULE, W. **Sulfoxone Sodium (Diasone) in the Treatment of Leprosy. A Summary Analysis of Field Reports.** *Internat. J. Leprosy.* New Orleans. 1951, July–Sept., v. 19, No. 3, 265–75.

This is an analysis of 22 reports covering 1,430 cases treated with Diasone, which had been supplied to leprosy institutions scattered all over the world. Of all the cases 74·8 per cent. showed improvement, 18·8 per cent. were unchanged, 5·2 per cent. were worse and 1·2 per cent. had died. The periods of treatment varied from 3 to 6 months up to 2½ years. On dividing the cases up according to the various areas it was found that there was clinical improvement of 91·4 per cent. in Central Africa, of 31·8 in Central Asia, of 80 per cent. in West Indies-Guiana, of 88·8 per cent. in the Middle East, and of 74·9 per cent. in Oceania. In the Philippines, where the largest number was reported on, there was improvement of 74·9 per cent. In most other particulars such as bacteriological improvement it was not possible to come to any conclusions from the reports received. " It was the consensus of the collaborators that the treatment

of leprosy with sulfoxone [Diasone] is very gratifying, and offers a greater incidence of clinical improvement than has been seen with any of the other drugs which antedate the sulphones." *Ernest Muir*

Roy, A. T. **Diaminodiphenylsulphone (DDS) in Leprosy : its Effect on Haemoglobin, Weight, Bacteriological Index and Reaction.** *Indian Med. Gaz.* 1951, Aug., v. 86, No. 8, 373–5.

This is an analysis of the results of DDS treatment in 98 patients over periods up to 24 months. The results are : 2 negative, 5 nearly negative, 10 with 75 per cent. fewer bacilli, 14 with 50 per cent. fewer bacilli, 43 slightly improved, 14 stationary, and 10 worse. " The 2 cases that became negative were already of low bacteriological index. The cases which become worse (10·3 per cent) were also not of very high bacteriological index, the highest being 33·5 and they were treated for a good period of average 18·6 months. The stationary cases (14·4 per cent) were of the highest bacteriological index except 2.... 24·8 per cent. cases were not affected bacteriologically with DDS treatment in 2 years." It is considered that DDS tablets in moderate doses of 50 to 150 mgm. daily can safely be given to most patients without any special attention or special diet. In no case was the treatment stopped for non-tolerance.

Ernest Muir

Jucovsky, J. Sôbre a autosôroterapia sulfonada na lepra. [**On the Sulphonated Autoserotherapy of Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, Sept., v. 19, No. 3, 166–92, 4 figs. [17 refs.]

Twenty-five patients were treated with a combination of promin and the injections of serum derived from their own blood. Among the improvements noted were subjective lessening of symptoms ; 56 per cent. improvement in the number of erythrocytes ; all the patients with reactions benefited ; some patients showed improvement in the skin appearances. There is nothing to indicate how much of the results were due to promin and how much to the serum.

Ernest Muir

Muraz. Afrique Noire Française. De la nécessité d'y réorganiser la lutte contre la lépre et d'y organiser la lutte contre la filariose (volvulose oculaire). [**French West Africa. The Need for Reorganizing the Campaign against Leprosy and for Organizing a Campaign against Ocular Filariasis**] *Bull. Acad. Nat. Méd.* 1951, v. 135, Nos. 33/34, 588–90.

In this article the Medical Inspector General of French Colonial Troops criticizes what has been hitherto done to control these two diseases. He calculates that there are in French West Africa about 200,000 cases of leprosy of which only about 34,000 are receiving any treatment. Most of these are on chaulmoogra injections and only a few hundreds have received sulphone treatment. He speaks of the difference of opinion as to whether DDS should be injected in an emulsion with chaulmoogra or with groundnut oil. Once that is settled the point of most importance will be to increase the number of treatment centres and the European and African personnel. He calculates that if fortnightly injections of sulphone emulsion are substituted for the present weekly injections of chaulmoogra, then twice the number of cases can be treated with the same personnel.

The author also makes a plea for a campaign against onchocerciasis, which is responsible for so much blindness. *Ernest Muir*

ROTBERG, A. & BECHELLI, L. M. O dispeánsrio na profilaxia da lepra ; sua importância crescente e sua modernização. [**The Dispensary in the Prophylaxis of Leprosy. Its Growing Importance and Modernization**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, June, v. 19, No. 2, 70–74. English summary.

BURGESS, Perry. **Born of those Year. An Autobiography.**

This book is reviewed on p. 463.

HADLER, W. A. Estudo histológico das lesões de lepra murina em involução. [**The Histological Study of Lesions of Rat Leprosy during Involution**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, June, v. 19, No. 2, 75–83, 14 figs. on 3 pls. English summary.

Rats were inoculated with Stéfansky's bacillus by the peritoneal route and later treated with DDS and other drugs. The involution-forms of the lesions as examined histologically are divided into three stages. In the first stage there is involution at the margin only, in the second the centre also is affected, and in the third the lesions diminish in size. The lepra cells are first found full of bacilli. The bacilli then become fewer and vacuoles develop. In the next stage some cells degenerate and become necrosed, while in others there is reduction of the size of the cytoplasm and bacilli are few or absent. The latter cells then gradually become changed back into reticulo-endothelial cells and take their place in the tissues. Meanwhile the bacilli become changed morphologically and gradually disappear. The changes are similar to those found during the involution of lesions in human leprosy. The article is illustrated with 14 photomicrographs. *Ernest Muir*

MAURI, A. C., HADLER, W. A. & CARVALHO, C. M. Quimioterapia da lepra. I. Ação do 4,4′-diamino-difenil-sulfona na lepra murina. [**Chemotherapy of Experimental Murine Leprosy. I. Action of the 4-4′-Diamino-Diphenyl-Sulphone on the Development of Murine Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, June, v. 19, No. 2, 85–116, 20 figs. (1 folding). [33 refs.] English summary.

Three lots of rats were taken. Lot A, consisting of 38 rats, were inoculated intraperitoneally with Stéfansky's bacillus and 8 days later treatment with DDS was begun. Lot B, with 12 rats, began DDS treatment 7 months after inoculation. Lot C were 57 and were inoculated with Stéfansky's bacillus but had no treatment and acted as controls. The rats in lot A, after allowing for what was discarded of the drug, got on an average 42·66 mgm. of DDS per day, and those in lot B presumably got the same. At the 11th month, 44·33 per cent. of the treated animals were alive, but only 1·75 per cent. of the controls. Macroscopically and histologically the lesions were fewer and smaller in the treated than in the controls. Also the survival rate of lot B was better than that of the controls, and the macroscopic lesions of those that survived were either nil or comparatively small. Reference is made to the work of GRUNBERG and SCHNITZER (*Ann. New York Acad. Sci.*, 1951, v. 54, 107) who gave DDS to mice inoculated with Stéfansky's bacillus but only for 28 days, and then concluded that the drug was ineffective. The present authors conclude that though DDS does not at first prevent the formation of lesions it slows up the disease and later brings about involution of the lesions. This is strikingly brought out by means of illustrations in the text. The amount of DDS in relation to body weight given was in comparison with that tolerated by man enormous, and it may be that this was a cause of death of some of the treated rats, thus obscuring to a certain extent the beneficial results of treatment. *Ernest Muir*

HELMINTHIASIS

Mackie, T. T., Larsh, J. E., Jr. & Mackie, Janet W. **A Survey of Intestinal Parasitic Infections in the Dominican Republic.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 825–32. [15 refs.]

"1. A group of 1139 individuals on two sugar properties on the south coast of the Dominican Republic have been surveyed to determine the prevalence of intestinal parasitic infections.

"2. The percentage prevalence of the most common pathogenic parasites are: Hookworm 59·2% ; *Trichuris trichiura* 58·9% ; *Endamoeba histolytica* 34·2% ; and *Ascaris lumbricoides* 20·1%.

"3. Clinical amebiasis is not common among the indigenous population and no instance of hepatitis or amebic abscess of the liver has been encountered.

"4. Clinical hookworm disease is not common in this portion of the Dominican Republic despite widespread infection of the population investigated.

"5. Differences in prevalence of the most common parasites observed between the two Bateys and the cane field villages are probably to be attributed to local population densities, local rainfall and soil conditions, and varying availability and use of latrines."

Watson, J. M. **Studies on Bilharziasis in Iraq. Part VI. Seasonal Variation of the Vector Snail,** *Bulinus truncatus*. *J. Faculty of Med., Baghdad, Iraq.* 1951, v. 15, Nos. 3/4, 33–68, 9 figs. [19 refs.]

A systematic investigation of the *Bulinus truncatus* population in a group of restricted habitats outside the city of Baghdad was carried out in order to determine the seasonal variation in the numbers of snails and their reproductive activity. Sampling, by dipping, was conducted at weekly intervals over a period of nearly two years. This revealed that snails are most abundant in summer and autumn or from the beginning of June to the end of November. The peak population occurs in July and there is another peak in October. Reproductive activity, calculated on the basis of the number of egg clutches in relation to the number of snails collected, is greatest in September, but two secondary peaks occur, one in June and one in November.

The principal factor influencing both snail population and reproductive activity is the temperature of the water. The threshold temperature at which snails emerge from hibernation is apparently 25°C., which the water attains at the end of the third week in May, but the mud in which the snails are buried takes longer to warm up, hence the snails do not appear till early in June. When the temperature falls below 25°C. towards the end of November, the snails go into hibernation and bury themselves in the mud at the bottom of streams, pools and swamps. There is thus a danger season from June to October which may sometimes include May and November, depending on the weather and time of annual flooding of the Tigris and Euphrates rivers.

J. J. C. Buckley

Azar, J. E., Tabbara, R. & Pipkin, A. C. **A Report on the Intensive Treatment of Vesical Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 383–8, 1 fig. [13 refs.]

An intensive curtailed form of treatment of schistosomiasis, such as that suggested by Alves and Blair [this *Bulletin*, 1946, v. 43, 344] is peculiarly suited to mass treatment under field conditions. It is necessary to be satisfied that such a method of treatment is safe before applying it generally. Nine

Iraqui patients suffering from vesical schistosomiasis, due to proven *Schistosoma haematobium* infections, were treated intensively over a period of 3 days with " Repodral-Winthrop " [Fouadin]. Studies were made of their histories and physical condition ; these included X-ray examination of the chest, a cephalin-flocculation test, a urea clearance test, and serial electrocardiographic examinations. Changes in the E.C.G. were the only significant evidence of toxic effect of the treatment observed, and they occurred in all the patients. Although others occurred in some cases the change constantly noted was a lowering of the T waves in most of the leads. All the E.C.G. changes observed were reversible, and in 8 of the 9 cases they had entirely vanished 2 or 3 weeks after the completion of treatment. In none of these cases were they associated with clinical evidence of cardiac abnormality either during or after treatment. Nevertheless, in view of previous reports in the literature [see this *Bulletin*, 1948, v. 45, 719, 1949, v. 46, 1060] on the unpleasant accidents due to circulatory failure which have occurred with this form of treatment, the authors recommended that it should not be used in patients with cardio-vascular disease.

A. R. D. Adams

Foster, H., Leitch, J. G. & Redstone, I. **An Account of a Small Outbreak of Intestinal Schistosomiasis in Eritrea.** *J. Roy. Army Med. Corps.* 1951, Dec., v. 97, No. 6, 455–60.

Twenty-five men of a platoon serving in Eritrea bathed or washed in a pond ; fourteen of them subsequently were found to have developed *Schistosoma mansoni* infections. Three civilians bathing in the same area also contracted the infection. The average time elapsing before symptoms showed was 4 weeks ; the commonest symptom was diarrhoea ; bronchitis and fever also occurred. These three were considered a pathognomonic triad. Eosinophilia in the affected varied from 4 per cent. to 56 per cent. One patient complained of weakness and paraesthesia of the left side of the body ; this largely vanished under treatment with nilodin. Antimony, in the form of fouadin or stibophen, was used in treatment apparently successfully. *A. R. D. Adams*

Standen, O. D. **The Effects of Temperature, Light and Salinity upon the Hatching of the Ova of** *Schistosoma mansoni*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 225–41, 6 charts.

" (1) The effects of variation in temperature, light and salinity on the hatching of *S. mansoni* ova are described.

" (2) Temperature of 4°C. inhibits hatching but does not materially affect the viability of the ova when favourable conditions are restored. Temperature of 37°C. also has an inhibitory effect. Of the temperatures used, 28°C. appears to be the optimum.

" (3) Bright light promotes hatching and darkness almost completely inhibits it.

" (4) Plain water provides the optimum conditions for hatching and increased salinity inhibits hatching in direct proportion to the concentration. Salinity as low as 0·05 per cent. has some inhibitory effect and hatching normally ceases in saline above 0·6 per cent.

" (5) The best miracidial yield is obtained when fresh water is used throughout sedimentation and incubation but with low temperature and darkness as inhibitors during the sedimentation periods.

" (6) The information provided by these experiments may prove of value in the development of a test for the presence of ova of *S. mansoni* in faeces. This would offer a parallel test to that employed at present for *S. haematobium* ova in urine."

Pacheco, G. & Jansen, J. Destruição de cercárias de *Schistosoma mansoni* com sabões associados a matérias corantes. [**Destruction of** *Schistosoma mansoni* **Cercariae by Use of Soaps associated with Dyes**] *Brasil-Médico.* 1951, Aug. 4 & 11, v. 65, Nos. 31/32, 301–4. [In parallel Portuguese and English.]

" Sodium oleate and sodium ricinoleate exert larvicidal action on cercariae, up to a dose of 1/500, in 50 minutes. Acridine orange and brilliant green showed greater activity, producing death up to a dilution of 1/100,000 within the same period of time.

" The addition of sodium oleate to stain, however, increased the larvicidal activity of the dye enormously ; addition of acridine orange increased it 200 times, brilliant green blue increased it 50 times.

" Despite the hydrolysis of sodium oleate, the mixture maintained its activity almost intact during 24 hours exposure in the laboratory. The addition of organic matter (normal horse serum) had relatively little effect in reducing the larvicidal action."

Fain, A. Les mollusques transmetteurs de *Schistosoma mansoni* au lac Albert. [**Snail Vectors of** *Schistosoma mansoni* **at Lake Albert**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 423–39, 2 maps. [14 refs.]

During a 6-month search for snail vectors of *S. mansoni* at Lake Albert, the author collected and examined large numbers of molluscs of all kinds. Several of these are newly recorded from the region.

Natural infections with cercariae of *S. mansoni*, identified as such by inoculating mice, were found in two kinds of Planorbidae, *Biomphalaria alexandrina stanleyi* Smith and *B. alexandrina pfeifferi* Krauss. Of the former species, which is found mainly in the lake itself, 16 were infected out of 6,855 examined ; of the latter, which does not occur in the lake but was collected in small streams in the Kasenyi plain, 12 were infected out of 875 examined. It is concluded that of the two species, the most important vector must be the form which occurs in the rivers, not the lacustrine species. No schistosome infection was found in 287 specimens of *B. alexandrina tanganyicensis* Smith nor in any of the other species of snails collected. *J. J. C. Buckley*

Lagrange, E. Essai de lutte biologique contre les planorbes. [**Trials of Biological Control of Planorbids**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 447–9.

The following is a free translation of the author's summary in French :—

Larvae of the Pleurodele Newt, when introduced into an aquarium, devoured the *Daphnia* and *Planorbis glabratus* which were present. These animals, therefore, would appear to be useful in control of Schistosomiasis but they do not occur in Central Africa. *J. J. C. Buckley*

McMullen, D. B., Komiyama, S., Ishii, N., Endo-Itabashi, T. & Mitoma, Y. **Results obtained in testing Molluscacides in Field Plots containing** *Oncomelania nosophora*, **an Intermediate Host of** *Schistosoma japonicum. Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 583–92. [16 refs.]

" 1. Out of 59 chemicals and mixtures tested in the laboratory on *O. nosophora*, 26 were selected for tests in field plots.

"2. Six of these gave encouraging results. They included: calcium cyanamide, sodium dinitro-o-cresol, dinitro-o-cyclohexylphenol, its dicyclohexylamine salt, pentachlorophenol, and sodium pentachlorophenate."

McMullen, D. B., Komiyama, S., Ishii, N., Endo-Itabashi, T., Ozawa, K., Asakawa, T. & Mitoma, Y. **The Use of Molluscacides in the Control of *Oncomelania nosophora*, an Intermediate Host of *Schistosoma japonicum*.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 593–604.

"Three chemicals, sodium pentachlorophenate, dinitro-o-cyclohexylphenol, and its dicyclohexylamine salt, have been tried under field conditions in the control of *Oncomelania nosophora*. At the dosages used they gave similar results but the first two were much less expensive. These two chemicals cost about one half as much as calcium cyanamide, a compound that has been used in snail control in the area where these experiments were conducted. The more than 18 miles of ditches treated offered a wide variety of habitats. The molluscacides were least effective in areas where the sides of the ditches had loose rock walls. The reduction in the snail population averaged 81·7 per cent in areas treated in October. When treated in the spring the average reduction was 87·7 per cent. When the molluscacides were applied in the autumn and the spring, the reduction averaged 95·4 per cent. Surveys conducted the following autumn showed that a few young snails were present in some of the areas. Eradication of *Schistosoma japonicum* in an area would necessitate a more or less continuous surveying and use of a molluscacide, until the snails were eliminated, or the human and reservoir hosts were no longer infected."

Hunter, G. W., Ritchie, L. S. & Tanabe, H. **The Epidemiology of Schistosome Dermatitis ("Koganbyo") in Japan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 103–12, 3 figs. [23 refs.]

"(1) A 'paddy itch' in the valley area adjacent to Lake Shinji, Shimane Prefecture, Japan, was discovered to be a schistosome dermatitis, the first reported in Japan. The disease is known locally as 'koganbyo' or 'lakeside disease' and is of public health concern.

"(2) The aetiological agent is the cercaria of a bird schistosome, *Gigantobilharzia sturniae*, n.sp. by Tanabe. The intermediate snail host is *Polypylis hemisphaerula* Benson, and the definitive hosts include the large starling, *Spodiopsar cineraceus* (Temminck); the sparrow, *Passer montanus saturatus* Stejneger; and the wagtail, *Motacilla* (*motacilla*) *grandis* Sharpe.

"(3) The snail intermediate host occurs in irrigation ditches and rice paddies, commonly in seepage water between ridges prepared for winter crops.

"(4) The environment of the snails in the paddies is drastically changed in the preparation of the soil for rice; many snails are buried in the mud, but escape during cultivation.

"(5) 'Koganbyo' is moderate until the middle of July, by which time the preparation of the paddies, the transplanting and cultivation have been completed. During the time of the first weeding from mid-July to mid-August the disease reaches the peak of severity.

"(6) The incidence of infection in the snail was 5·5 per cent. in June, 1949, and 5 per cent. in June, 1950. During July, 1949, the incidence was only 1·4 per cent., yet the peak of 'koganbyo' begins in July and extends into August.

"(7) Intermediate and definitive hosts are widespread in Japan. Infected birds and snails have been found in areas other than Shimane Prefecture.

"(8) The term 'koganbyo' is proposed as the general term to be applied to schistosome dermatitis in Japan."

i. Sandars, Dorothea F. *Diphyllobothrium latum* (**Linné**) **in Australia.** *Med. J. Australia.* 1951, Oct. 20, v. 2, No. 16, 533–4. [13 refs.]

ii. Backhouse, T. C. & Bearup, A. J. *Diphyllobothrium* **in Australia.** [Correspondence.] *Ibid.*, Dec. 8, No. 23, 793–4.

i. The author, from the Queensland Institute of Medical Research, Brisbane, lists the few Australian records of *Diphyllobothrium latum* since 1906. These occurred in Tasmania, New South Wales, Queensland and Victoria. They were mostly in immigrants from the Baltic States. A few infestations from dogs in New South Wales and Queensland (Brisbane) are also recorded.

She then gives an account of the finding in Brisbane of a few proglottides in the stools of a young Irish immigrant, who had been aware of this infestation for 16 years. The proglottides were identified as being those of *D. latum.*

She suggests that the influx of immigrants from endemic areas increases the chance of this tapeworm being introduced into Australia. Many Australian animals would serve as intermediate hosts for the tapeworm and reservoir hosts for the infective sparganum. Water fleas abound in Australia and at least 3 species which may serve as intermediate hosts for the parasite have been recorded. It seems possible that the numerous freshwater fish of Australia might be suitable hosts for the sparganum.

It is therefore suggested that this tapeworm may readily become endemic in Australia. It is important that medical practitioners recovering tapeworms from patients should have them identified correctly. A note is given on the preservation of material.

ii. The writers of this letter, from the School of Public Health and Tropical Medicine, Sydney, comment on Sandars' observations and their possible implications.

The parasite is essentially a parasite of man in the fish-eating communities of freshwater lake regions of Northern Europe, but in the last 50 years endemic centres have been established in the Great Lakes region of North America, owing to settlement of Baltic immigrants in areas from which sewage reaches streams and lakes. These lakes are an important source of food fishes and the public health problems involved have resulted in control regulations.

In considering why a similar state of affairs has not occurred in Australia in the past, the authors quote figures to show that the Baltic population there between the wars was likely to have been sufficiently large to have allowed the possibility of endemicity under appropriate conditions.

Since the war, however, immigrants have come, with certain exceptions, largely from areas where the broad tapeworm is rare. Furthermore, the authors state that in 1948 they examined stools of 200 among 2,000 displaced persons in an immigration centre in New South Wales. Of these 200 people, 111 were Estonians, Lithuanians and Latvians. No tapeworm eggs or segments were found nor could any histories of infestation be brought to light. Nevertheless, large-scale immigration from Europe is likely to result in a few broad tapeworms being imported : in suitable environments, they could act as starting points for foci.

Freshwater lakes are few and small in Australia and contribute little to the fish supply. In certain defined areas, however, conditions favourable to the establishment of endemic foci might be created through increasing population and possibly changing food habits as a result of immigration from Central Europe, formation of fishing communities near freshwater lakes or relaxation of regulations controlling sewage disposal.

In the absence of these conditions, the authors believe that *Diphyllobothrium* infections in man would continue to be rare in Australia. Reasons are also

given to indicate that dogs are unlikely to constitute important reservoir hosts, though they might sometimes be a link in transmission.

The authors do not wish to deny the possibilities set out by Sandars nor to suggest that all precautions should not be taken. They endorse her suggestion that every effort should be made to identify tapeworms from human sources and add that circumstances relevant to the probable source of infection should also be investigated. *H. J. O'D. Burke-Gaffney*

VON BONSDORFF, B. Blutbildende Faktoren und Bandwurmanämie. [**Blood-forming Factors and *Diphyllobothrium* Anaemia**] *Schweiz. med. Woch.* 1951, Dec. 15, v. 81, No. 50, 1246–7.

The author's earlier work on this question has been abstracted in this *Bulletin* [see especially this *Bulletin*, 1948, v. 45, 920 and the references there given and 1949, v. 46, 154]. In this paper he briefly recapitulates the results of his earlier work on which is founded his view that *Diphyllobothrium latum* disturbs the interaction of the extrinsic and intrinsic anaemic factors. He also records experiments done in collaboration with Ruben GORDIN, designed to find out how this tapeworm interferes with this interaction.

The results of feeding 4 patients with extrinsic factor in the form of vitamin B_{12} led the author to suggest that, if the patient produces a large amount of intrinsic factor and conditions are in other respects favourable, the intrinsic factor operates on the extrinsic (vitamin B_{12}) so rapidly that there is absorption even in the stomach or duodenum, but that, if the amount of intrinsic factor produced is less, the vitamin B_{12} passes unabsorbed into the intestine, where the tapeworm can disturb the reaction. The results of the author's work with Wolmar NYBERG have shown that *D. latum* contains large quantities of vitamin B_{12}. The results of giving extrinsic factor in the form of dried substance of *D. latum* to 7 patients showed that, in general, 5 to 10 gm. of dried worm-substance gave enough extrinsic factor to give a satisfactory improvement of the blood picture.

The author concludes that his work supports the view that *D. latum* itself takes up vitamin B_{12} and thus removes the anti-anaemic substance that the host needs. *G. Lapage*

VON BONSDORFF, B. & GORDIN, R. **Oral Administration of Vitamin BI2 in Pernicious Tapeworm Anemia. *Diphyllobothrium latum* and Pernicious Anemia XII.** *Acta Med. Scandinavica.* 1951, v. 140, Supp. 259, 112–22, 10 figs. [13 refs.]

Pernicious anaemia due to fish tapeworm differs from Addisonian pernicious anaemia in that in the former the oral administration of beef extract or yeast extract (extrinsic factor) together with normal gastric juice (intrinsic factor) does not produce a remission. It has been shown that in Addisonian anaemia doses of vitamin B_{12} (*e.g.* 5 microgrammes daily) that produce a remission if given parenterally do not do so when given orally, unless normal gastric juice is added. The present experiments were designed to show whether this is also true of tapeworm anaemia.

Eight patients with tapeworm anaemia were selected in these experiments. The preparation of B_{12} used was Cobione (Merck) in daily doses of 5 micro-grammes. In two cases a concentrated liver extract meant for parenteral injection was used in the place of vitamin B_{12}, namely Heptomin (Medica), 4 ml. daily.

In 3 cases there was no response to oral vitamin B_{12} given for a week, either with or without normal gastric juice, but in each of the three cases there was

a satisfactory response with a reticulocytosis when anthelmintic treatment (felicin 3·5 grammes) was given. In the other 5 cases, there was a prompt response with a marked reticulocytosis and a sharp and steady rise in the red cell count when vitamin B_{12} (in 3 cases) or Heptomin (in 2 cases) was given orally without gastric juice. In 3 cases gastric juice was never given and in these cases when the anthelmintic was eventually given there was another reticulocyte rise suggesting that the response had previously not been maximal. In the other two cases after an interval vitamin B_{12} or Heptomin (one case each) was again given with gastric juice ; in each of these cases there was a slight reticulocyte response but no material increase in the rate of rise of the red cell count.

Thus, these patients with tapeworm anaemia reacted in two different ways, either they responded to the haematinic by mouth alone, or they did not respond even when gastric juice was added. In either case their behaviour differed from that of patients with Addisonian anaemia.

Whether the tapeworm, *Diphyllobothrium latum*, produces anaemia or not apparently depends on its position in the intestinal tract : if it is in the jejunum it either destroys the intrinsic factor or the extrinsic factor, prevents their interaction, or prevents absorption, whereas if it is in the ileum this interaction or absorption has already taken place by the time the intestinal contents reach the site of the worm. In these circumstances, it is easy to understand why in cases of tapeworm anaemia, when the worm is presumably in the jejunum, vitamin B_{12} does not produce a response, but it is less easy to understand why in certain cases it does : the authors assume that this must be a matter of individual variations in the amount of secretion of the intrinsic factor [see also this *Bulletin*, 1948, v. 45, 260 ; 1947, v. 44, 1081]. *L. E. Napier*

Schapiro, M. M. **Observations on the Treatment of Human Teniasis with Quinacrine Hydrochloride (Atabrine).** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 833–5.

" 1. Quinacrine (Atabrine dihydrochloride) orally in 34 patients with *Taenia saginata* infection produced expulsion of the worm within 1 to 2 hours after the saline purge. The worm was expelled alive in all instances. In 21 cases the worm and scolex were identified, while in only 13 cases the scolex could not be identified. In all of these cases repeated follow up stool examinations have been negative.

" 2. Quinacrine orally in the treatment of *Hymenolepis nana* infection was relatively ineffective, causing the expulsion of the worm in only two instances. The stools were not rendered free of ova after treatment.

" 3. No toxic effects were noticed in any patient in this series sufficient to warrant hospitalization for treatment."

Becker, B. J. P. & Jacobson, S. **Infestation of the Human Brain with *Coenurus cerebralis*. Report of a Fourth Case.** *Lancet.* 1951, Dec. 29, 1202–4, 2 figs.

The authors [this *Bulletin*, 1952, v. 49, 161] have already reported three cases of human infestation with *Coenurus cerebralis*, which is the bladderworm phase of the dog-tapeworm, *Taenia* (*Multiceps*) *multiceps*. They now report a fourth.

The patient was a European male, aged 28, born in the Transvaal, where he had, apart from 4 years service during the second world war, always lived. For 15 months before admission to hospital he had worked in a chromium mine. He had been brought up on a farm on which no sheep, but some dogs, were

kept. In September, 1950, he went to hospital with incessant vomiting and moderately severe headaches, but no gastro-intestinal cause of these was found. In February, 1951, he noticed unsteadiness on his feet and a tendency to sway to the right. In March of that year he noticed occasional double vision. Four weeks before admission to hospital he developed severe occipital headaches that radiated down the back of the neck to the shoulders and two weeks later he had severe vomiting.

On admission there was some nuchal rigidity and early papilloedema of the optic discs and some slow nystagmus when he moved the eyes to the left. There was slight ataxia of the left arm and leg and staggering to the left, together with fine tremor of the outstretched fingers. The reflexes were brisk, but normal, and there were no other clinical signs.

Examination with a ventricular catheter showed moderately enlarged lateral ventricles. The ventricular fluid had 3 neutrophiles per cmm., 6 lymphocytes and about 15 red blood cells per cmm. The Kolmer cardiolipin-Wassermann test and Lange's colloidal gold test were both negative. The fourth ventricle seemed to be considerably dilated.

The posterior fossa was explored surgically and " a large collection of closely packed cysts was removed. They measured 0·5–1·0 cm. in diameter." Numerous cysts were also removed from the anterior aspects of the medulla oblongata. There was a large cyst presenting at the dilated foramen of Magendie. This, and 3 other cysts at this site, were removed. No scolices were found in these cysts.

The patient was eventually discharged, but developed pains at the back of the neck, vomiting, some nuchal rigidity and a swelling over the operation site. A uniformly dilated ventricular system was then found and a second operation was done. After amputation of the left cerebellar hemisphere and opening of the fourth ventricle, numerous cysts were found in the fourth ventricle, together with severe ependymitis with granulation tissue one-eighth of an inch thick in the roof of the fourth ventricle. After appropriate treatment the patient " is now convalescing favourably ".

The average diameter of the cysts from the fourth ventricle was one-quarter of an inch. They looked cloudy-white and were filled with a turbid fluid. Several cysts were sterile, as the authors had previously noted in their report of 3 other cases, but in others numerous scolices were found, each of which had two rows of hooklets, the measurements of which are given. It was not possible to identify the species of *Coenurus*, but *C. cerebralis* is the only coenurus that has been found in the brain of man, although those of other species have been found in human muscles. There was no evidence of muscle infestation in the authors' patients. They hope in the future to identify any coenuri found by feeding dogs with them and obtaining the adult tapeworms.

The authors refer to a report of 13 cases of cysticercosis of the posterior fossa by Arana Iniguez and Asenjo (*J. Neurosurg.*, 1945, v. 2, 181), who found racemose clusters identical in appearance with those found by the present authors, but were unable to identify them ; and to a similar condition in 2 patients with basilar cysticercosis reported by Obrador (*Arch. Neurol. Psychiatr.*, 1948, v. 59, 457), who did not describe the histology of the cysts. [No reference is made to the five cases recorded in Craig and Faust (1951, *Clinical Parasitology*, 5th edn., p. 586) [this *Bulletin*, 1951, v. 48, 1159]. Two of these five cases occurred in England and one was apparently infected in South Wales. Four of these five cases are also recorded by Faust (1949, *Human Helminthology*, 3rd edition, p. 314, London, Henry Kimpton). These five cases, together with the four recorded by Becker and Jacobson, make a total of nine. [See also this *Bulletin*, 1949, v. 46, 65.] *G. Lapage*

READ, C. P. **Studies on the Enzymes and Intermediate Products of Carbohydrate Degradation in the Cestode *Hymenolepis diminuta*.** *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 1–18, 2 figs. [43 refs.]

BECK, J. W. **Effect of Diet upon Singly Established *Hymenolepis diminuta* in Rats.** *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 46–59, 5 graphs. [20 refs.]

" The onset and course of the elimination of eggs in the feces of rats of singly-established *Hymenolepis diminuta* has been studied. In both male and female hosts, eggs of this tapeworm first appeared about 18 to 20 days after inoculation, and the daily output gradually increased to a fairly stable level which was higher in males (average about 205,000) than in females (average about 167,000). Egg outputs were maintained at these levels for at least 150 days.

" In male rats on a complete diet the average number of eggs per proglottid was about 2100. Approximately 7·6 cm. of strobila was shed daily which is equivalent to about 8% of the worm's length.

" In female rats on deficient diet there was a drop in egg output to about 50,000 eggs/24 hours in about 30 days whereas in male hosts on deficient diet a comparable drop occurred only after a period of approximately 3 months.

" In normal male rats on deficient diet there was very little stunting of worm growth. In females on complete diet worm-size approximately equalled that in male rats, but on deficient diet the worms were significantly smaller.

" Vitamin B_{12} failed to raise the egg output in two normal female rats on deficient diet.

" An increase in egg output was associated with administration of male dog bile in both male and female hosts which continued in males until termination of the experiment, but which failed in females and resulted in a subsequent decrease in elimination of eggs. In both sexes there were unusually large fluctuations in egg output from day to day."

PIPKIN, A. C., RIZK, E. & BALIKIAN, G. P. **Echinococcosis in the Near East and its Incidence in Animal Hosts.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 253–60, 1 graph. [16 refs.]

" (1) Hospital admittance records, especially in an undeveloped country with limited transport and medical facilities, probably represent a poor criterion of prevalence of any disease. Persistently numerous admittances over a long period of time are thought, however, to suggest a focus of infection of appreciable extent. The report, therefore, of 385 cases of hydatid disease during the last 25 years in Lebanese, Syrian, Iraqian and Palestinian hospital records, is thought to constitute evidence that this part of the Near East is an endemic focus of hydatid disease of considerable importance.

" (2) Infection of the more usual definitive host, the dog, with *E. granulosus* apparently varies between 17 and 33 per cent. in this part of the Near East, with the average yearly infection more likely nearer 25 per cent. incidence among stray street dogs in the principal cities. The occurrence in certain areas such as Lebanon of a periodically heavy rate of canine infection—as high as 33 per cent.—presents a reservoir of infection for man which is comparable with that seen in countries notorious for the disease. This suggests that human infection is possibly greater than previously supposed.

" (3) The prevalence of echinococcosis among sheep varies between 4·6 and 41·4 per cent., fluctuating greatly between individual flocks, their source and where they were pastured. The present survey showed a relatively low incidence

of 6·6 per cent. among animals (2,100) and a higher estimate of 11·6 per cent. in a group of 500 animals, mostly female. The generally higher incidence (up to 41·4 per cent.) of hydatid infection which Turner et al (1936a) reported, suggests the influence of importation of flocks from more heavily infected areas such as nearby Turkey. Although the incidence in sheep is about one-fourth of that seen in cattle, cysts in sheep were much more often infective than those in cattle, so that they are probably still the main source of canine infection.

" (4) Incidence of hydatid infection in cattle varies from 8·4 to 47 per cent. in the four countries of the Near East under consideration, with the true incidence probably in the neighbourhood of 40 per cent. in coastal areas, with some indication of a generally lower prevalence inland. The relatively low infectivity of bovine hydatid cysts as compared with ovine cysts largely offsets this high incidence of hydatid infection in cows.

" (5) Hydatid infection in camels of the Near East varies between 67·4 and 100 per cent. as judged from examination of 34 animals in the present survey, and 15 such animals mentioned by Turner et al (1936a). Although showing a higher degree of actual infectivity than cysts from sheep or cows, hydatid cysts in camel meat very likely account for a very small percentage of canine infection since so few camels are slaughtered in comparison with sheep and cattle."

ARORA, R. B. **Ancylostomiasis. A Study.** *Indian Med. Gaz.* 1951, May, v. 86, No. 5, 203–4.

This study is based on a total of 631 cases of ancylostomiasis admitted to a general ward of a hospital in Central India : of these cases 91 were studied personally by the author.

The principal complaints were pain in the abdomen and in other parts of the body, weakness, breathlessness and palpitations, fever, oedema and ascites, mental dullness, and flatulence and indigestion. There was no complaint of ground-itch.

The main clinical findings were marked anaemia, puffiness of the face, oedema of the feet and ascites, dry harsh skin, a haemic murmur (41·7 per cent.), cardiac dilatation (19 per cent.), splenomegaly (20 per cent.), diminished knee jerks (30 per cent.) and a low blood pressure (mean 105/59).

The blood picture was usually that of iron deficiency, namely hypochromic and microcytic, but occasionally it was macrocytic (14 per cent.). Neither the degree of anaemia nor the severity of the symptoms could be correlated with the hookworm load. The leucocyte count was within normal limits or there was a slight leucopenia ; eosinophiles were increased, about 8 per cent. usually but in cases of splenomegaly the mean was 2 per cent. [The reviewer has repeatedly drawn attention to the low eosinophile percentage in cases of ancylostomiasis with kala azar ; this, however, is a non-endemic area for kala azar, which suggests that it is the splenic hypertrophy rather than the leishmania infection that determines the relatively low eosinophile percentage.]

Nearly all (80 per cent.) had occult blood in the stools and 21 per cent. had a positive indirect van den Bergh reaction.

There was depression of metabolism and renal efficiency in most cases ; the basal metabolic rate and the kidney function percentage were lower in heavily infected patients irrespective of the degree of anaemia, but both showed the greatest depression when there was severe anaemia and a heavy load, and both tended to improve with the reduction in hookworm load following treatment.

The infection in every case was with *Ancylostoma duodenale*, and was either moderate or heavy [no figures are given]. [This appears to have been a very detailed study and it is a pity that the author could not have reported his results in greater detail. The cases must obviously have undergone some selection since in no hookworm-infected population will one fail to find some lightly infected cases.] *L. E. Napier*

MATSUSAKI, G. **Studies on the Life History of the Hookworm. Part VI : On the Development of *Ancylostoma caninum* in the Normal Host.** *Yokohama Med. Bull.* 1950, Dec., v. 1, No. 2, 111–20, 12 figs. on 1 pl. [23 refs.]

The fate of infective hookworm larvae which enter the host by the mouth is inadequately known. The author claims to have proved that infective larvae of *Ancylostoma caninum*, administered orally to dogs, complete their development to the adult stage in the intestine and normally do not migrate elsewhere. He inoculated 150 young dogs orally with *A. caninum* larvae and examined them *post mortem* at intervals from 30 minutes to 18 days later. Most of the larvae were found in the alimentary canal. Relatively few were recovered from the lungs and trachea and these showed no morphological development. *J. J. C. Buckley*

BLAAS, K. H. & PFEUFFER, F. Abwasseruntersuchungen auf Spulwurmeier in einer städtischen Kläranlage. [**Examination of Sewage in a Municipal Sewage Works for the Eggs of *Ascaris***] *Städtehyg.* Freiburg/Breisgau. 1951, Nov., v. 2, No. 11, 301–4.

Reference is made to various methods of investigating sewage for the numbers of *Ascaris* eggs which are present. The method here employed was to dry the centrifugate from a measured volume of sewage on a glass slide and then to treat it with methyl benzoate before examination under the microscope.

Sewage from different stages in purification and at different depths in tanks was examined and yielded results which were sometimes unexpected. For example, the number of eggs found in sewage samples taken at different distances from the inflow into a tank did not diminish regularly as that distance increased. This observation led to some experiments on the complexities of flow in tanks, by means of dyes such as fuchsin, eosin and pyoktanin. Some of the factors influencing the flow of sewage in tanks are discussed.

There was also a considerable difference in the results of several egg counts made on the same sample and on different samples taken from the same place. The reasons for these discrepancies lie in the fact that sewage is not a homogeneous liquid. Detachment from time to time of egg-containing sludge adhering to the baffles in the tank may cause the differences in the number of eggs found in a series of samples taken from the same spot. *M. E. Delafield*

TAKATA, I. **Experimental Infection of Man with Ascaris of Man and the Pig.** *Kitasato Arch. Exper. Med.* 1951, Mar., v. 23, No. 4, 49–59. [14 refs.]

Seventeen human volunteers were fed with infective eggs (about 25 eggs to each person) of *Ascaris lumbricoides* from pigs. Two of the volunteers were fed a second time, making 19 experimental feedings in all. Seven of the 19 began to pass eggs after prepatent periods of 25, 28, 27, 27, 29, 50 and 75 days respectively. Eggs ceased being passed in 4 cases after 5 to 11 days and in 3 after 95 to 101 days. Observations were made on clinical symptoms after the feeding of the eggs, and coughing was noted in most cases including some

of the negative ones. Adult worms were not recovered from the positive cases and it is assumed that after egg deposition ceased, the worms were evacuated spontaneously. Concurrently with these experimental feedings, 7 human volunteers were fed with infective eggs of *A. lumbricoides* from man and all became infected, passing eggs after prepatent periods of 67 to 73 days.

This appears to be the first report of the successful infection of man with *A. lumbricoides* from the pig. The author comments on the unusually short prepatent period in 5 of the 7 positive cases and also on the relatively short duration of the periods of egg deposition. The latter is taken to indicate, together with the fact that only 7 out of 19 volunteers became infected, that *A. lumbricoides* from the pig is physiologically different from *A. lumbricoides* from man. *J. J. C. Buckley*

LOUGHLIN, E. H., RAPPAPORT, I., JOSEPH, A. A. & MULLIN, W. G. **Treatment of Human Ascariasis with Hetrazan. The Use of a Syrup containing 1-Diethylcarbamyl-4-Methyl Piperazine Dihydrogen Citrate (Hetrazan).** *Lancet.* 1951, Dec. 29, 1197–200. [11 refs.]

Quoting evidence in support of their statement that ascariasis is probably the most prevalent cosmopolitan helminth infection, the authors remark that the injurious effects of *Ascaris* have been overlooked in eradication campaigns, while those of hookworm have been over-emphasized. The authors then outline the many ways in which *Ascaris* may injure its host and discuss the drawbacks of anthelmintics used against it (oil of chenopodium, santonin, hexylresorcinol). HEWITT *et al.* (*J. Parasit.*, 1948, v. 34, 237) reported that hetrazan was effective against ascariasis of dogs. OLIVER-GONZALEZ, SANTIAGO-STEVENSON and HEWITT [this *Bulletin*, 1949, v. 46, 385] reported on the effects of hetrazan on 6 cases of human ascariasis. ETTELDORF and CRAWFORD [*ibid.*, 1951, v. 48, 486] treated 15 children infected with *Ascaris* with the dihydrogen citrate salt of hetrazan. They regarded the drug as being very effective, but the intensity of the worm-burden was not ascertained. RUIZ-REYES, *et al.* (*Rev. Palud. Méd. Trop.*, 1950, v. 2, 35) using doses of 2·3 mgm. daily for 3 successive days, concluded that hetrazan was not the best drug for ascariasis, but considered it useful for treating small children, because it is easily given and its toxicity is low (see also HOEKENGA below).

The present authors used the dihydrogen citrate salt of hetrazan in Haiti and treated 26 patients with 6 mgm. of the drug per kgm. body weight 3 times a day for 5 days. Faecal samples were examined by the S.A.E.X. concentration technique [see LOUGHLIN and SPITZ, this *Bulletin*, 1949, v. 46, 1152], and eggs were counted by the Stoll dilution method. This was done before treatment and on the 3rd, 5th, 8th and 14th days after the end of treatment. The worm-burdens of the patients varied between 2 and 266 ascarids. By the 14th day the counts of ascarid eggs had been reduced by 92·1 per cent. in the patients as a group ; in 12 of them no ascarid eggs could be found from the 8th to the 14th day. In the others the reductions of egg-counts ranged from 63 to 97 per cent.

Trying to shorten the period of treatment the authors gave to a second group of 14 patients doses of 10 mgm. of hetrazan per kgm. body weight 3 times a day for 3 days. But this dosage caused intestinal cramps and reduction of appetite in almost all the patients and vertigo and lassitude in 6 of them. The egg-counts were reduced by 84 per cent. The authors concluded that about 6 mgm. per kgm. body weight 3 times a day for 5 days was the optimum dosage from the points of view of efficiency and toleration.

Small children had difficulty in swallowing the hetrazan tablets and had to take them in milk or food ; and for field treatment the minimum number of doses was advisable. A syrup of hetrazan, containing 30 mgm. of its dihydrogen

citrate salt per ml. was therefore made. This was flavoured with cherry and was very palatable and easily given when it was diluted with water. This syrup was used to test the effects of larger single doses and to compare doses of 6 mgm. with those given in tablet form.

For this purpose the authors selected 3 groups of patients aged from 3 to 70 years. Tables record the egg-counts observed. Group 1 (43 patients) were given doses of syrup containing 13 mgm. of hetrazan per kgm. body weight once a day on 3 successive days. It was estimated, on the basis of 1 pair of *Ascaris* per 2,000 eggs per gramme of faeces, that these patients had 2 to 182 ascarids. On the 14th day after treatment the egg-counts of the entire group had been reduced by 86 per cent. In 17 patients there were no ascarid eggs 14 days after treatment. In 3 of them the egg-counts were reduced by the 7th day, but rose to about their original level by the 14th day. The egg-counts of two patients were reduced by only 31 and 48 per cent., being reduced considerably by the 7th day, but increased again by the 14th day. The remaining 21 patients showed a reduction of egg-counts varying from 50 to 98·5 per cent. Group 2 (24 patients) had 2 to 260 ascarids. They were given a dose of the syrup containing 13 mgm. per kgm. body weight on the first day, and 20 mgm. per kgm. once a day on the second and third days. On the 14th day after treatment the egg-counts of this group as a whole had been reduced by 95 per cent., and at that time there were no eggs in the faeces of 16 patients. The reductions of the egg-counts of 6 patients ranged from 87 to 98 per cent. Two patients showed reductions of 67 and 69 per cent. Group 3 (37 patients) had doses of syrup containing 13 mgm. of hetrazan per kgm. once a day for 4 successive days. They had 2 to 144 ascarids. By the 14th day after treatment the egg-counts had been reduced by 91 per cent. in the entire group and at that time there were no ascarid eggs in the faeces of 20 patients. The reduction of the egg-count in one case was 56 per cent. and in 16 cases it ranged from 65 to 99 per cent.

The patients reported that the worms were expelled from the second day after treatment, but that most were expelled on the third and fourth days after administration of the syrup or the tablets. The worms were either " stunned, dying or dead ". Hetrazan did not significantly affect the egg-counts of *Enterobius*, hookworm, *Trichuris trichiura*, *Hymenolepis nana*, *H. diminuta*, *Taenia solium* or *T. saginata*. Toxic reactions were noted in only one patient, who had 13 mgm. of the drug for 4 days and was suffering from severe yaws ; he had vertigo, mild depression and loss of appetite, none of them severe enough to warrant stopping the treatment.

The authors claim that their results show that hetrazan, given in adequate doses, is effective against human ascariasis and think that the doses given by Ruiz-Reyes *et al.* were inadequate. They prefer the syrup, because it obviates the use of multiple doses daily and is easier to give to small children. The larger single daily doses given in the syrup seemed to be more effective than smaller doses given more often in tablet form. Another advantage of hetrazan is its almost complete lack of toxicity. Because the worms expelled by it were stunned or dead, it is unlikely to irritate ascarids to abnormal migrations or to the " balling up " in the intestine that may cause intestinal obstruction.

G. Lapage

HOEKENGA, M. T. **Treatment of Ascariasis with 1-Diethylcarbamyl-4-Methyl-Piperazine Hydrochloride.** *Southern Med. J.* 1951, Dec., v. 44, No. 12, 1125–7.

The author refers to the favourable reports of the use of hetrazan for the treatment of human ascariasis quoted above and to the less successful results obtained by HEWITT and MAZOTTI (personal communication to him), WANSON

[this *Bulletin*, 1949, v. 46, 957] and COLBOURNE [*ibid.*, 1950, v. 47, 768]. The former group of workers used hetrazan in Porto Rico, the Philippines, Mexico and Tennessee ; the latter group used it in Mexico, the Belgian Congo and the Gold Coast. Perhaps, suggests the present author, there is a geographical variation in the susceptibility of *Ascaris* strains to hetrazan ; or the explanation may lie in the dosage. The author tried to find out whether a single large dose or a fairly large one given for a short period could be effective. He treated 38 (*sic*) mestizo patients, 34 males and 5 females, living in or near La Lima, Honduras, who had varying mixtures of Spanish, Indian and Negro ancestry. Their ages varied from 2 to 76. Eight were given a total of 900 mgm. of hetrazan in 3 equally-divided doses in one day ; 15 were given 1 gm. in a single dose ; and 15 were given 200 mgm. three times a day for 3 days, a total of 1·8 gm. None of the patients was fasted or purged before or after the doses and none showed any toxic effects. The *Ascaris* expelled were alive and the author thinks that this partly explains the lack of toxicity, because there was no risk of absorption of toxic products from dead *Ascaris*.

The results are shown in a table that also gives the results obtained by the other workers mentioned above, together with the dosages used by them and by the present author. With the two lower doses the faeces of only one-third of the patients became free from eggs of *Ascaris*. There was an apparent cure in 60 per cent. of the patients who had 1·8 gm. of hetrazan spread over 3 days. The drug had no effect on *Entamoeba histolytica*, *Giardia intestinalis* or *Balantidium coli*. There was an apparent cure of one of 2 patients with *Trichomonas hominis*, 2 of 15 patients with *Necator americanus* and 7 of 17 patients with *Trichuris trichiura*. The author describes these results as " unspectacular ". He concludes that hetrazan obviously has an ascaricidal effect if it is given in large enough doses over a long enough time. Fasting and purging are not needed. It is useful for debilitated persons and young children whom it is not desirable to fast or purge and for these the doses recommended by ETTELDORF and CRAWFORD [this *Bulletin*, 1951, v. 48, 486], namely 6 mgm. 3 times a day for at least a week, would probably be the best [but see Loughlin above and his use of the syrup]. The author considers, however, that hetrazan is not the ideal drug for mass treatment, for which a drug effective in a single dose is required. *G. Lapage*

ROMAÑA, C., TORANZOS, L. B. & MARCOLONGO, R. Tratamiento de ascaridiosis con " Hetrazan ". (1-Diethyl-Carbamyl 4-Methyl Piperazine Hypochloride.) [**Treatment of Ascariasis with Hetrazan**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 153–6.

The English summary appended to the paper is as follows :—

" The authors report on treatment with ' Hetrazan ' of children parasitized by Ascaris lumbricoides. Two children in 12 did not show any more eggs of the parasite for one month after the treatment, in which 10 mg per day for each kilo of body weight was used for seven days. In two other cases a second treatment of 30 mg during four days was necessary to obtain an identical result."

SENOO, T. & LINCICOME, D. R. **The Presence of Malayan Filariasis in Korea.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 269–73, 2 figs. on pl. [20 refs.]

In this paper the literature of filariasis in Korea is reviewed and it is reported that, during 1942–44, the microfilariae of *W. malayi* were found in the blood of 604 patients out of 5,001 examined. The patients came from 25 villages

in Southern Korea and Quelpart Island. Measurements of the microfilariae, taken from 127 specimens and fixed by different methods, are provided together with a photomicrograph and camera lucida drawing of a microfilaria.

The insect vectors are apparently unknown but *Anopheles hyrcanus* var. *sinensis* is said to be present in Korea. Unidentified species of *Mansonia* are also said to have been recognized. *J. J. C. Buckley*

Senoo, T. & Lincicome, D. R. **Malayan Filariasis : Incidence and Distribution in Southern Korea.** *U.S. Armed Forces Med. J.* 1951, Oct., v. 2, No. 10, 1483–9, 1 fig.

This report contains an analysis of the results of examination of the blood of the 5,000-odd patients for *W. malayi* infection [see above] with reference to age, sex and geographical distribution. The highest incidence (26·6 per cent. of 971 persons examined) occurs on Quelpart Island and is much greater than that of any of the localities sampled on the mainland of South Korea. In Quelpart Island the incidence in men and women is about equal and also in the south-western part of the mainland. In the south-eastern part of the mainland there is a higher incidence in men than in women.

J. J. C. Buckley

Pick, F. Nouvelle méthode d'enrichissement des Microfilaires sanguicoles "*in vivo*". [**New Enrichment Method for Detecting Microfilariae in Blood**] *Acta Tropica.* Basle. 1951, v. 8, No. 2, 154–7, 2 figs.

An intestinal invagination was found on post-mortem examination of a baboon from Kindia and when sections of the intestine were cut, numerous microfilariae were seen in the congested veins. Previous examination of the blood of about 100 baboons from the same locality had failed to reveal the presence of microfilariae. This finding was attributed to either the rarity of the infection or to such a scarcity of microfilariae in the blood that they were overlooked by ordinary methods of examination. The accidental finding of the microfilariae in congested vessels of the intestine suggested to the author the idea of induced congestion as a method of concentrating and hence of revealing the presence in the blood of very small numbers of microfilariae. Ten young baboons from Kindia were used in the experiment. By means of a clamp ["*pean*"] congestion was induced in the marginal vein of the ear and after 5 minutes this was cut and thick blood smears were made from several drops of blood. In 7 of the animals examined thus, microfilariae were found. [The author does not state if the blood of these animals had previously been examined for microfilariae by the usual methods.] Microfilariae were found only in the first drop of blood to be taken from the marginal vein and were never more than two in number.

The microfilariae are believed to differ morphologically from those of *Loa papionis* Treadgold, 1920. *J. J. C. Buckley*

Bras, G. & Lie Kian Joe. **Histological Findings in Lymph Nodes of Patients with the Meyers–Kouwenaar Syndrome.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Dec., v. 3, No. 4, 289–94, 7 figs.

[See also this *Bulletin*, 1950, v. 47, 861.]

Mazzotti, L. **Observations based on Cutaneous Biopsies in Onchocerciasis.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 624–7.

"1. A total of 3,310 cutaneous biopsies performed on 16 onchocercal patients revealed a distribution of microfilarias which confirmed previous observations

of the author, namely that the shoulder and neighboring areas give a greater percentage of positive results than any other regions of the body.

" 2. In biopsies on patients with a single nodule, more microfilarias were found at the shoulder than at the site of the nodule, in 66% of the cases. This would seem to indicate that the microfilarias distribute themselves over the entire upper part of the body, a finding which does not support the common practice of taking skin from the vicinity of the nodule.

" 3. Although it has been recognized that the density of microfilarias may vary from time to time, the data here given show that negative biopsies may frequently alternate with positive ones on the same patient over a period of time, and hence repeated biopsies are important to reach a diagnosis or evaluate the results of therapy."

DÉJOU, L. Les localisations profondes de la dracunculose (péritonéales et juxta-péritonéales en particulier). [**Deep Localizations of Guinea Worm Infection, Particularly in Relation to the Peritoneum**] *Méd. Trop.* Marseilles. 1951, July–Aug., v. 11, No. 4, 645–52, 3 figs. [12 refs.]

The author of this paper maintains that there are gaps in our knowledge of the life-history of *D. medinensis* in the human body. The larval form in *Cyclops* is liberated by the action of the digestive process, then traverses the gastro-intestinal tract to develop further in the mesentery, where it is thought that copulation with the male form takes place and is immediately followed by the death of the latter. The fecund female then migrates to the connective tissues. Clinical experience of Guinea worm infection in man gives support to the experimental evidence regarding the deep migration of the guinea-worm in the mesentery ; the intraperitoneal location should be considered as a deviation from the normal route. In reality the larval Guinea worm traverses the mesenteric tissues where they are continuous with the retro- and sub-peritoneal spaces. In this situation calcified or encysted adult stages are frequently found, especially is this so during operations for inguinal hernia.

But it is in muscular masses, and in the deep sub-aponeurotic tissues that some other individuals of *D. medinensis* terminate their careers prematurely encysted in abscesses. Finally those female worms that have been successful in avoiding dangers, obey the law inherent in this species, and reach the superficial tissues to deposit their embryos.

There appear to be indications that an understanding of these migrations would explain certain pseudo-peritoneal syndromes, acute and transient, which are encountered from time to time in tropical practice.

Certain peripheral oedematous conditions of the softer superficial tissues appear in the wake of the migratory worm and it takes little to imagine what would happen under similar condition in the duodeno-pancreatic region.

The urticaria which is an early symptom is accompanied by weals and oedema, with conjunctival hyperaemia and fever. Asthmatic dyspnoea, vertigo and syncope may aggravate the clinical picture of anaphylactic shock.

Very often, even after a negative laparotomy, the real diagnosis is clinched, it may be several months afterwards, by the appearance of the adult worms.

Philip Manson-Bahr

LÓPEZ-NEYRA, C. R. & BALCÁZAR RUBIO, M. La dirofilariosis conjuntival, nueva afección humana. [**Infestation by *Dirofilaria conjunctivae* ; a New Disease of Man**] *Rev. Ibérica de Parasitología.* 1951, Oct., v. 11, No. 4, 369–86, 3 figs. [12 refs.] English summary.

[It is not clear why this is called a " new disease ", for though this record may be the first from Spain, it is, so the author states, the twenty-second case of subcutaneous parasitism by this helminth.] The worm is in nature a parasite of

dogs, conveyed by mosquitoes. In the present instance the patient was a woman of 40 who had always lived near Elche, just south of Alicante on the east coast of Spain. She felt one day a pricking sensation on the front of the left forearm and there was local inflammation lasting for 3 days and leaving a small nodule the size of a pea which was extirpated ; examination of it revealed " nothing worthy of attention ". Two months later a similar nodule appeared. A filamentous structure was found on its removal and was sent for diagnosis. It measured 84 mm. × 0·34 mm., with ovaries, uterus and intestine, but the head was missing.

The remainder of this article is taken up by brief notes of the 21 cases already recorded and a discussion on the nomenclature of the worm, 9 species of *Dirofilaria* being named and the subgenus *Nochtiella*. Those interested in the nomenclature should turn to the original where much detail is given and many references. *H. Harold Scott*

Basnuevo, J. G., Cowley Chavez, O., Sotolongo, F., Blanco Rabassa, E. & Achkar, R. Un nuevo tratamiento de la tricocefaliasis. [**A New Form of Treatment of Trichuriasis**] *Semana Méd.* 1951, Nov. 8, v. 99, No. 19, 882–5. [14 refs.]

For some 5 years past the authors had noticed that retention enemata of chloroquine and of hexylresorcinol led to marked reduction in *Trichuris trichiura* passed in the muco-sanguinolent discharge in patients with recto-colitis. This led them to try hexylresorcinol in infestation by this worm. Using a strength of 1 : 300 they found, after the first enema, a large number of distintegrated worms were expelled and after the third no more were seen at all. The difficulty was to obtain a suitable solvent for the drug and they found it in glycerin in a proportion of 1 to 15. A homogeneous suspension of this was obtained in 300 cc. of water, but after 24 hours it separated into two layers. They next found that if the water was replaced by 275 cc. of 5 per cent. gum acacia this separation into layers no longer took place.

The authors' mode of procedure is detailed thus. The day before the treatment only light liquid food is permitted and an evacuant enema is given that evening at 9 p.m. and another, 2 hours before the treatment, at 6 a.m. the following day. A solution [emulsion?] of barium sulphate, 10 per cent., is prepared and hexylresorcinol added to make 1 : 300. The child is placed on its back and a calibre 22 catheter passed as high as possible beyond the rectum, some 15 cm. and watched by fluoroscope till the fluid fills the colon ; the child is turned and the abdomen massaged to distribute the fluid to the caecum. Thus is determined the amount needed to inject to fill the colon, and a solution of hexylresorcinol, 1 : 300 of 5 per cent. gum acacia is administered at 37°C. slowly in the same way as before. The enema is usually retained for 10 to 30 minutes. The quantity varies, of course, according to the age and weight [? size] of the child ; usually it is 400 to 800 cc. ; generally 15 cc. per lb. body weight or 0·05 gm. hexylresorcinol per lb. up to 80 lb. The enema is repeated every second or third day.

The authors record that 20 patients have received this treatment. A large number of worms are expelled after the first, and thereafter [presumably after the 2nd or 3rd enema] no more worms or ova are seen, the patient gains weight and leaves hospital " completely restored ". *H. Harold Scott*

Scheibe, G. Untersuchungen über die Appendicopathia oxyurica und ihre Therapie. [**Studies on *Appendicopathia oxyurica* and its Treatment**] *Med. Klin.* 1952, Jan. 4, v. 47, No. 1, 11–12.

Recently various authors have described ileocaecal lymphadenitis as a complication of appendicitis and this condition has been related to enterobiasis

of the vermiform appendix [see WELCKER, this *Bulletin*, 1951, v. 48, 909]. The author has observed a non-specific acute inflammation of the mesenteric glands in patients free from worms, especially in children 4 to 8 years old. Clinically and at operation these patients practically always showed the same features, namely, localized tenderness on pressure, a resistance or an abnormal muscular defence reaction to palpation at " the typical place ", indicating involvement of the peritoneum and small knotty areas of resistance, especially noted in thin persons, which could be identified as intraperitoneal glands. Rectal examinations were negative. The conditions revealed at operation corresponded to those described by Welcker. In some patients there was a yellowish clear exudate [presumably from the glands]. There was hyperplasia of the lymphatic tissue. Sometimes the inflammation extended to the distal part of the ileum and to the caecum. In the cases of very acute appendicitis and in the gangrenous, phlegmonous forms and in abscesses, there was no enterobiasis.

For treatment of the patients with enterobiasis the author used phenothiazine in the form of Contraverm. Among 247 cases of appendicectomy 183 showed ileocaecal lymphadenitis and 167 were infected with *Enterobius*. Appendicitis was commonest between May and July. Enterobiasis was also most frequent during these months, but the author does not regard this as an indication of a general summer increase of enterobiasis ; he has evidence, as other authors have, of a winter increase of it.

He divided the patients into 4 groups.

Group 1 were patients from whom the appendix was not removed. After diagnosis of enterobiasis in all cases by the Cellophane-strip method, two courses of Contraverm, as advised by HÄNEL and WEISS [this *Bulletin*, 1949, v. 46, 961], were given and another Cellophane-strip test was taken. There were 18 cases in this group. All gave positive tests before the treatments and after them 2 remained infected and 3 showed relapses.

Group 2. After diagnosis of Enterobiasis in all seven patients by Cellophane-strip tests, two courses of treatment were given and the appendix was then removed. *Enterobius* was found in the lumen of the appendices of 4 patients, but its eggs were not found in any of them. Patients were still infected 14 days later. One Cellophane-strip test was positive after the operation, but was negative 14 days later.

Group 3. After a Cellophane-strip test, positive in all the 22 cases in this group, one course of Contraverm was given and the appendix was then removed. In 12 cases *Enterobius* was found in the appendix and in 2 cases eggs resembling those of *Enterobius* were found in the lumen of the appendix.

Group 4 consisted mostly of 40 clinically more acute cases. The appendices were removed and two courses of Contraverm were then given. *Enterobius* was found in the lumen of the appendix in all 40 cases and " the contours of " its eggs were found in the appendices of 3 of them. After the two courses of Contraverm, Cellophane-strip tests of all the 40 patients were all negative, and some of these patients remained free of worms for 3 to 6 months.

The author infers that the results obtained with the patients in group 2 indicate that two courses of Contraverm do not influence the reservoir of *Enterobius* in the appendix. After appendicectomy there is a better chance of controlling the worms. Results obtained with the patients in group 3 show that one course of Contraverm is not enough.

Discussing the findings of eggs in the lumen of the appendix in patients in groups 3 and 4, the author suggests that eggs may possibly be laid under the influence of mechanical, thermal and other conditions prevailing when the operation is done. The author concludes that the efficiency of Contraverm is beyond question. The results obtained renew the conception of the appendix as a reservoir of, and refuge for, *Enterobius*, and clinicians must reckon with

this ; but the operation results indicate that, in most cases, infection of the appendix is completely unrelated to the state of the appendix, with the exception of the very acute or purulent forms of appendicitis. Decision to operate on these cases has to rest on very few clinical symptoms and there is no certain symptom of *appendicopathia oxyurica* ; yet so many cases of acute or very acute appendicitis present no signs other than those described for this condition. A positive Cellophane-strip test, together with the typical signs obtained on palpation, make a diagnosis of this condition probable. In the author's patients, when there was massive infection of the appendix with *Enterobius*, there was always marked pain at McBurney's point.

For cases with abdominal pain suggesting appendicitis and a positive diagnosis of enterobiasis, the author recommends appendicectomy and a subsequent anthelmintic treatment. He also suggests this treatment in cases of massive infection with *Enterobius* and for obstinate cases which have repeated relapses. Hygienic preventive measures should also be taken.

G. Lapage

Senter, W. J. **Trichinosis : its Prevalence, Diagnosis and Prevention.** *Southern Med. J.* 1951, Dec., v. 44, No. 12, 1127–30. [13 refs.]

A general paper, with a report of a case.

Hill, C. H. **The Recovery of Encapsulated, Infective Larvae of *Trichinella spiralis* relatively Free of Muscle Tissue.** *Proc. Helminthological Soc. of Washington.* 1951, July, v. 18, No. 2, 114–20, 2 figs.

" A new method of quickly determining the presence of *Trichinella spiralis* in muscle tissue has been described. The recovery of large numbers of trichina cysts from heavily infected meat is possible with this method. In employing it, a choice of sedimentation, which requires 35 to 50 minutes and a small amount of blended material, and of screening, which requires about 5 minutes and the use of either gelatinous or voluminous blended material, is offered.

"Experimental evidence is given that the new technique is equal to the digestion technique in its ability to detect infections of small intensity and is approximate to it in the numbers of larvae recovered from heavier infections. Larvae so recovered by the new technique seem to possess greater infectivity than those recovered by the digestion method."

Bozicevich, J., Tobie, J. E., Thomas, Elizabeth H., Hoyem, Helen M. & Ward, S. B. **A Rapid Flocculation Test for the Diagnosis of Trichinosis.** *Pub. Health Rep.* Wash. 1951, June 22, v. 66, No. 25, 806–14.

The various steps in this flocculation test, from the preparation of the *Trichinella* extract from infected rats to the final test proper, are set down in great detail and cannot be summarized. When the results of flocculation and complement-fixation tests on 139 sera were compared, no difference in sensitivity was found and no falsely positive reactions were given by the flocculation test. The flocculation test, however, has the advantage that it produces results in a few minutes and does not require highly skilled operators. The antigen has been found to remain stable for months. Preliminary studies indicate that the test may be useful in diagnosing brucellosis, tularaemia and certain parasitic diseases other than trichinosis. *J. J. C. Buckley*

LUONGO, M. A., REID, D. H. & WEISS, W. W. **The Effect of ACTH in Trichinosis: A Clinical and Experimental Study.** *New England J. of Med.* 1951, Nov. 15, v. 245, No. 20, 757–60.

Between 1936 and 1945 there were 287 cases of trichiniasis in New England and 7 deaths occurred. During the period of invasion by the larvae the symptoms (here given as fever, leucocytosis, eosinophilia and inflammation of skeletal muscle) suggest the action of a toxin or a severe allergic reaction by the host. ACTH and cortisone have a dramatic effect on many diseases in which an antigen-antibody reaction seems to play a major part. The authors tried ACTH in 3 cases of trichiniasis and the favourable results led them to try its effect on experimentally-infected guineapigs.

The 3 cases treated are described. The first was a woman aged 35 who had eaten roast pork about 3 weeks before her illness. Her symptoms are described in some detail. On the 6th day in hospital she was given 10 mgm. of ACTH four times a day at intervals of 4 hours. Four hours after the first dose the temperature, which had before been fluctuating between 101° and 106°F., fell to 98·4°F. Before the first dose her eosinophile count was 10,300 per cmm. and this fell to 3,900 per cmm. 4 hours after the first dose of ACTH. The pulse and respiration became normal and there was, during the first day of ACTH, less muscle pain and soreness and less fatigue. ACTH was continued for 6 days and the improvement continued. On the 5th day biopsy of the gastrocnemius revealed larvae of *Trichinella spiralis* surrounded by an inflammatory exudate of mononuclears with occasional neutrophiles and eosinophiles. ACTH was stopped after 6 days and a brief rise of temperature to 101·8°F. followed, but this fell to normal during the next 4 days. The patient was discharged fit for normal duties.

The second patient was a woman aged 35 with similar symptoms and a white cell count of 11,450 per cmm. with 37 per cent. eosinophiles. She had been infected by pork sausages. About 2 weeks after the onset of symptoms, when the temperature had become normal and the white cell count was 11,250 with 35 per cent. of eosinophiles, she was given 10 mgm. of ACTH four times a day for 6 days. After the first day of this treatment there was " dramatic improvement " which persisted.

The third patient was a man aged 35, the husband of the second, who had been infected by the same sausages. His white cell count was 17,050, with 65 per cent. of eosinophiles. He was given the same treatment with the same results.

For the experiments with animals the authors used 32 young guineapigs weighing about 250 gm. After a week of observation for disease, white cell, eosinophile and differential counts were done on them and they were given graded doses of larvae of *Trichinella spiralis*. A suspension obtained by digestion of infected rat-muscle containing about 2,250 larvae per cc. was used. Group 1 of these animals, consisting of 20 guineapigs, were given graded doses of larvae ranging from 15 to 55 larvae per gm. of body weight (1·5 to 6 cc. of the suspension). Group 2, of 12 guineapigs, were given " extremely large doses of larvae, *i.e.*, 10 cc. of the suspension, or a total of approximately 22,500 larvae ". The guineapigs were observed for fever and diarrhoea and white cell and eosinophile counts and blood smears were done. In Group 1, when fever and a significant eosinophilia appeared, half the animals were segregated and given 10 mgm. of ACTH daily in four equal doses ; the other half had no treatment. In Group 2 half were given 12 mgm. of ACTH daily, beginning 48 hours after the larvae were administered ; the other half were not treated. Muscle biopsies of representative animals were taken at the height of the fever and eosinophilia, and autopsies were done on all animals that died and sections were made.

At the beginning of the experiment the rectal temperatures of the guineapigs ranged from 100·4° to 102°F., the leucocytes ranged from 5,100 to 10,450 per cmm. and the eosinophile count ranged from 25 to 150 per cmm.

In Group 1 all the animals had some diarrhoea and rise of temperature. Eight of these animals had larger doses of larvae (5 to 6 cc. of the suspension) than the other 12 of this group and these 8 had more diarrhoea and fever rising to 104°F. by the 14th day after administration of the larvae. On the 16th day half of these 8 were given ACTH and within 24 hours the average temperature had fallen from 104·2° to 102·4°F. For 8 days more these animals showed minor elevations of temperature and then the temperature gradually increased and all died between the 26th and 27th days, except one that lived for 2 months and then was killed. The animals of this group that had no ACTH followed the same course up to the 16th day, after which the temperature rose to 104° to 105°F. and all died during the next 72 hours.

In Group 2 half the animals were given 12 mgm. of ACTH daily after administration of the larvae and this was kept up for 28 days. All these died within 4 days of withdrawal of ACTH. All the untreated animals of this group died between the 16th and 24th days.

In both groups all the animals showed a temporary, but striking, fall in the number of eosinophiles. The larvae removed by biopsy from treated animals were not anatomically different from those removed from untreated ones.

Thus relatively small doses of ACTH given to 3 human patients strikingly diminished the subjective symptoms and the fever and caused a temporary fall in the number of circulating eosinophiles. In the guineapigs ACTH produced no demonstrable anatomical difference in the larvae or in the response of the host to them, but there appeared to be a temporary reduction of the eosinophilia and a reduction of toxic effects and the treated animals survived longer than the untreated ones.

ACTH therefore appears to alter the clinical course of trichiniasis favourably and, in man, once the course of the disease is over, it is self-limiting.

G. Lapage

DEFICIENCY DISEASES

CULWICK, G. M. **Diet in the Gezira Irrigated Area, Sudan.**

This book is reviewed on p. 465.

CULLUMBINE, H. **A National Nutritional Survey in Ceylon.** *Ceylon J. Med. Sci.* (Sect. D.) 1951, Mar., v. 8, Pt. 1, 17–50. [16 refs.]

During 1948 and 1949 the Physiology Department of the University of Ceylon carried out a diet survey on 1,307 families, involving 6,332 persons. The families surveyed were chosen from urban, rural and estate populations and involved families of different economic status, and were probably a representative sample of the population of the island. A clinical examination of 5,395 persons covered by the dietary survey was also carried out. This revealed under-nourishment 19 per cent., xerosis 46 per cent., phrynoderma 38 per cent., aribinoflavinosis 4 per cent., anaemia 43 per cent., and dental caries 33 per cent. [The diagnostic criteria are not stated.]

If the minimal daily allowances per adult Ceylonese man are taken to include :—

Calories	...	2,200
Protein	...	65 gm.
Calcium	...	500 mgm.
Vitamin A	...	10,000 i.u. as carotene
Thiamine	...	1·2 mgm.

then, of the families surveyed, only 54 per cent. came up to standard as regards calories, 60 per cent. as regards protein, 49 per cent. as regards calcium, 20 per cent. as regards vitamin A content, and 56 per cent. as regards thiamine. Both the low quality of the diet and the incidence of deficiency diseases was greater among families with incomes of less than 20 rupees per head per month.

An interesting feature is that at all economic levels wheat formed 30 per cent. of the total cereal intake. This shows Ceylon's dependence on food imports and, in the present world food circumstances, the limitations in her choice of cereal.

The general picture presented is the familiar one common to all rice-eating countries in South-East Asia with a surplus of people and a deficiency of rice. The details are clearly of the first importance to the Health and Agricultural authorities within the Dominion. *R. Passmore*

FAINE, S. & HERCUS, C. E. **The Nutritional Status of Cook Islanders.** *Brit. J. Nutrition.* 1951, v. 5, Nos. 3/4, 327–43, 2 figs. [30 refs.]

"1. A representative sample of Rarotongans has been investigated by clinical and laboratory methods and their nutritional status assessed.

"2. The results showed that malnutrition is neither a widespread nor a serious problem except that the influence of European food apparently plays an important part in the very common unhealthy state of the teeth and mouth.

"3. The diets were apparently sufficient in protein, carbohydrate, fat, minerals and vitamins.

"4. Obesity was common, due possibly to racial as well as dietary factors. The physique of both adults and children compared favourably with that of similar groups in other countries."

SMITH, D. A. & WOODRUFF, M. F. A. **Deficiency Diseases in Japanese Prison Camps.** With an introduction by J. BENNET. *Med. Res. Council Spec. Rep. Ser. No. 274.* pp. viii+209, 17 figs. (1 folding) & 5 pls. [Numerous refs.] 1951. London : H.M. Stationery Office. [6*s.* 6*d.*]

In December 1941 Hong Kong surrendered to the Japanese and Singapore fell in February 1942. Thereafter, some 2,500 European civilians in the former and up to 5,000 in the latter, persons of all ages and both sexes, lived in Japanese prison camps for over three and a half years. During this time they existed under dietary and hygienic conditions similar to those of the poorest of the Asiatic people. This report describes their struggle, together with that of 12,900 members of the Australian Imperial Force made prisoner of war in Singapore. The number of these latter in Singapore was greatly reduced by the departure of working drafts to Thailand and elsewhere. Both the authors spent the full period in prison and were personally responsible for much of the food planning.

Within these camps the full range of tropical deficiency diseases was seen. There was both general under-nourishment, caloric deficiency, and qualitative

under-nourishment, deficiency diseases. These diseases appear to differ in no significant manner in their manifestation in Europeans and Asiatics. There is probably nothing fundamentally new in the descriptive section of the report. However, the systematic signs and symptoms are so accurately recorded by the observers, obligatorily at close quarters to their patients, and the correlations with the dietary changes so precise, that the report is an outstanding piece of clinical description. There is probably no better account of tropical nutritional disorders in the medical literature. As such it is recommended to all doctors about to proceed to tropical appointments. The account of the diverse manifestations of beriberi is especially to be commended.

Of outstanding significance is Appendix A—methods devised for utilizing foods and other products of nutritional importance. These unfortunate prisoners were in possession of two priceless things—detailed scientific knowledge and boundless ingenuity. It is astonishing what they were able to accomplish with their limited resources. Rice polishings and bran, soya beans, yeast, bones, pine-needle tea, rubber-tree seeds, tapioca (cassava) leaf, snails, cultivation of yeast, preparation of grass and green leaf extracts, these are some of the title headings of the paragraphs in this appendix. It was by attention to such things that the people were kept alive. From the figures given, it would appear that the crude death rates in the civilian camps, which included many infants and old persons, were less than 15 per 1,000 per year. This low figure is a remarkable tribute to those responsible for the health of the prisoners.

The report is an outstanding record of how intelligent and industrious men can survive under appalling conditions. The 69 tables in the text bear evidence of the accurate note-taking and recording by the medical and quartermaster staff of the camps. It is impossible within the scope of a review to mention the many important practical points of detail that are discussed : not a few of them may be of great value to indigenous tropical people, faced with similar dietary circumstances. All health officers in the tropics are advised to get this report, to read it and to keep it at hand for reference. *R. Passmore*

McQueen, E. G. **Cirrhosis of the Liver in Ex-Prisoners of War (Japan) : a Preliminary Communication.** *Med. J. Australia.* 1951, July 28, v. 2, No. 4, 122–3.

During 1950, 4 men, all formerly prisoners of war in Malaya, were admitted to hospital in Queensland complaining mainly of malaise, loose stools and upper abdominal discomfort. All had hepatomegaly and impairment of liver function shown by high levels of serum globulin, serum bilirubin and urinary urobilinogen, and by positive flocculation tests. One man had amoebiasis, a second had previously been treated for it and two harboured hookworms. Treatment of the latter provoked a severe attack of jaundice in one case. Liver tissue, obtained by biopsy, showed in all cases marked fibrosis, most evident in the portal tracts. It is suggested that the cirrhosis was a sequel of nutritional deficiency during captivity and may have been of a nature similar to that produced by dietary restriction in experimental animals and to that frequently found in malnourished people in many tropical and sub-tropical areas.

Dean A. Smith

Waterlow, J. C. **What is Kwashiorkor ?** *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 15–20. [31 refs.]

This is a useful review of the literature. It is considered that the term kwashiorkor should be restricted to describe a nutritional syndrome with the

following characteristics (described in a tentative definition by BROCK and AUTRET) :—

(*a*) retarded growth in the late breast-feeding, weaning and post-weaning phase,
(*b*) alterations in skin and hair pigmentation,
(*c*) oedema,
(*d*) fat infiltration, cellular necrosis or fibrosis of the liver,
(*e*) a heavy mortality apart from proper dietary treatment,
(*f*) the frequent association of a variety of dermatoses.

If kwashiorkor is limited in this way, there is still a use for such terms as "distrofia policarencial hidropigenica", "nutritional dystrophy", and even "tropical malnutrition" to cover nutritional disorders found in many parts of the world and as yet imperfectly defined. The very vagueness of these terms should compel authors to give full descriptive details.

R. Passmore

WATERLOW, J. C. **Observations on the Activity of some Enzymes in the Human Liver.** *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 41–8, 1 fig. [21 refs.]

This paper reports observations on material obtained by liver biopsy from infants and young children suffering from kwashiorkor in West Africa. In 7 cases the level of non-specific choline esterase in the liver was low (12·5–38·8 units : normal about 60 units). In four, who made good recoveries, the levels rose on treatment (42·9–60·0 units). The cytochrome oxidase activity was variable, as also that of the lactic acid dehydrogenase, in some patients the values being above and in some below normal. In 34 instances parallel estimations of esterase activity in the liver and plasma were made and a correlation between the two was found.

It is concluded that in these subjects there was a specific reduction in esterase activity, by comparison with other enzymes. The significance of this reduction to alterations in protein metabolism is discussed. *R. Passmore*

GELFAND, M. **Kwashiorkor in a Breast-Fed Infant.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 393–6, 1 fig.

In Salisbury, Southern Rhodesia, an African female infant, aged 3 months, was admitted to hospital with general oedema, diarrhoea and vomiting, and an extensive non-inflammatory hyperkeratotic dermatosis. The hair was pale and spare. She was breast-fed by a mother who had a good flow of milk. Ten days after admission she died, although she had continued to suck well. At autopsy a smooth yellow fatty liver was found.

The conclusion is drawn that since this child, with the typical picture of kwashiorkor, was apparently getting a sufficiency of good protein (the mother's milk contained 1·35 per cent.) kwashiorkor cannot be attributed to a lack of protein.

[This is clearly an unusual case and the cause of this particular illness must remain uncertain ; but it does seem rash to use a single obscure illness to tilt at a hypothesis that has so much clinical and epidemiological support.]

R. Passmore

JAYASEKERA, H. T. W., DE MEL, B. V. & CULLUMBINE, H. **Fatty Liver Disease of Children in Ceylon.** *Ceylon J. Med. Sci.* (Sect. D.) 1951, Mar., v. 8, Pt. 1, 1–16. [41 refs.]

The clinical and biochemical findings are described in 40 Ceylonese children aged 9 to 84 months, with enlarged livers, oedema and other signs of malnutrition. There appears to be no essential distinction between the condition

of these children and kwashiorkor as described in Africa. Diets low in protein probably constituted the most important aetiological factor. *R. Passmore*

Hill, K. R., Rhodes, Katerina, Stafford, J. L. & Aub, R. **Liver Disease in Jamaican Children (Serous Hepatosis).** *West Indian Med. J.* 1951, Sept., v. 1, No. 1, 49–63, 6 figs. [27 refs.]

In this paper is recorded the clinical and pathological findings of 137 Jamaican children aged between 1 and 3 years suffering from liver disease. For the most part these children presented a picture of apparently good general nutrition, and had normally developed muscles and a well-covered trunk. Evidence of associated vitamin deficiencies was unusual. Oedema, when it occurred, was confined to the legs and invariably associated with ascites and was presumably secondary. Generalized starvation oedema was not seen. In all these respects the condition differs from kwashiorkor. However, like kwashiorkor, the disease was always associated with a diet low in protein and especially lacking in animal protein. Whether or not this is an important aetiological factor is uncertain. It is tentatively suggested that toxic factors may be contributory, but the nature of such factors, if indeed they exist, is uncertain. Anaemia, malarial and parasitic infections were neither constant nor severe in the group. Twelve patients died. Liver biopsy was carried out on 63 others, and the main portion of the paper is an account of the histology of the liver.

Histologically the liver disease appears progressive. First, there is a serous exudate distending the potential spaces surrounding the sinusoids and centrilobular veins. This is followed by an amorphous eosinophilic protein coagulum giving the impression that the coagulum was the product of a local concentration of protein as a result of a physical-chemical change. All investigations support the concept that the coagulum formation occurs *in situ* and is secondary to the serous exudate. Histo-chemically the coagulum gives the tinctorial reactions of collagen. Finally the process goes on to an extensive fibrosis. At no stage do the authors report an excess of fat in the liver specimens.

[This is an important paper, which all those interested in nutritional disorders of the liver should read. The concept of an extensive liver fibrosis following upon an outpouring of a serous exudate convertible into collagen, must lead to a reconsideration of the nature of these disorders.] *R. Passmore*

HAEMATOLOGY

King, E. J., Bartholomew, R. J., Geiser, M., Ventura, S., Wootton, I. D. P., Macfarlane, R. G., Donaldson, R. & Sisson, R. B. **Determination of Haemoglobin. VIII. Accuracy of Methods applied to Abnormal Bloods.** *Lancet.* 1951, May 12, 1044–5. [12 refs.]

In previous papers of this series the various methods of estimating haemoglobin have been described and evaluated ; these methods have included the estimation by clinical instruments, by iron analyses, by oxygen and carbon-monoxide capacities, by colorimetric and photometric procedures and with the simple grey-wedge M.R.C. photometer [see this *Bulletin*, 1949, v. 46, 662, 663]. In all these, " normal " blood has been used : in the present paper blood in anaemic states and other diseased conditions is used.

The same techniques were used. The patients were divided into 5 groups, those with conditions not affecting the blood, *i.e.*, normals—12 cases ; two groups of patients with anaemia—10 and 11 cases respectively ; patients with jaundice—10 cases ; and a miscellaneous group including 6 patients with methaemoglobinaemia—13 cases. The instruments used were the M.R.C. photometer, the Beckman spectrophotometer, the Spekker absorptionmeter, and a photo-electric single-cell test-tube colorimeter ; and the methods were the oxyhaemoglobin, carboxyhaemoglobin, acid haematin, alkaline haematin and cyan-haematin. In addition the haemoglobin was estimated by iron analysis, carbon-monoxide capacity and oxygen capacity.

The results are shown in a table in which the mean values of each group by each instrument by each method (with certain exceptions) are given, together with the coefficient of variation of each group from the iron analysis of the corresponding blood sample.

" The base-line results (iron and gas capacity) show a pattern already familiar from the earlier papers in this series dealing with normal blood samples. Iron analysis and total haemoglobin measured by CO capacity after reduction are in good agreement. The oxygen capacity is about 3–5% lower, presumably because it does not measure inactive haemoglobin (and methaemoglobin if present). In the present samples these inactive pigments seem to be present in normal amounts.

" In the colorimetric methods there is also good agreement between the average haemoglobin values and the iron results. Many of the coefficients of variation are higher than those found using similar methods on normal blood samples. However, the average haemoglobin concentrations of this present series are much lower than those found previously. The coefficient of variation is calculated by expressing the standard deviation as a percentage of the mean ; hence the diminished mean values have correspondingly increased the coefficient of variation.

" The calculation of the results has involved the use of factors, extinction coefficients, etc., which had been determined in experiments with normal blood. It is apparent that these coefficients are appropriate to the pathological blood samples studied here. The earlier papers in this series presented conclusions drawn from haemoglobin methods applied to samples of blood from healthy laboratory personnel and other normal people. These conclusions seem applicable also to the estimation of haemoglobin in pathological blood samples."

L. E. Napier

Dierckx, F. & Helmons, J. Complément à l'enquête sur la vitesse de sédimentation globulaire chez le Noir du Congo. [**Further Studies on the Erythrocyte Sedimentation Rate on Africans in the Congo**] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 511–21, 5 figs.

This study is based on readings by the Westergren method on early morning samples of blood from soldiers, their wives, sons and daughters in a military camp at Coquilhatville in the equatorial region of the Belgian Congo.

Of 643 men, 85·69 per cent. had a sedimentation rate of 15 mm. or less in one hour ; of 330 women, 65·57 per cent. of 20 mm. or less ; of 112 boys 39·27 per cent. of 15 mm. or less, and of 108 girls, 57·39 per cent. had a rate of 20 mm. or less. It is remarked that the women appeared as well nourished as the men though their rate was consistently higher, whereas the rate among girls was lower than among boys. Clinical findings among those in each group with accelerated rates are discussed, but the apparent lack of correlation throws doubt on the value of the test as a reliable clinical guide. [For earlier work by the authors, see this *Bulletin*, 1951, v. 48, 398.] *C. C. Chesterman*

Fukushima, K., Senda, N., Uenoyama, T., Inui, H., Ishigami, S., Kariya, A., Naka, K., Iwasaki, T. & Sakao, K. **Copper Deficiency Anemia in Human Adults.** *Med. J. Osaka Univ.* 1951, Aug., v. 2, No. 3, 503–16, 2 figs. [32 refs.]

Kaplan, E., Zuelzer, W. W. & Neel, J. V. **A New Inherited Abnormality of Hemoglobin and its Interaction with Sickle Cell Hemoglobin.** *Blood.* 1951, Dec., v. 6, No. 12, 1240–59, 7 figs. [46 refs.]

Chanarin, I. **Mediterranean Anaemia. An Investigation of Nineteen Cases in a Single Family.** *South African Med. J.* 1951, Sept. 15, v. 25, No. 37, 671–5, 2 figs. [15 refs.]

The family tree shows three generations of a family of which the grandfather was born in St. Helena and showed evidence of Cooley's anaemia trait and the grandmother was a coloured woman who was not investigated. Of 8 children of this marriage, all had Cooley's anaemia or the trait, but of 3 sons-in-law two were normal and one had the disease of a moderate degree (group iii, see below). Of the 10 grandchildren 9 showed either the trait or the disease and one died [presumably in infancy] prior to this investigation.

The subjects were divided into 3 groups according to (i) whether they had the characteristic anaemia with evidence of excessive blood destruction and regeneration, (ii) whether they had the characteristic anaemia only, or (iii) whether they showed only evidence (target cells or reduced fragility of the red cells) of the trait.

Group I. There were 3 in the second generation and one in the third. The main symptoms were those of anaemia—lassitude and dyspnoea—chronic leg ulceration, persistent slight jaundice which was subject to exacerbations, splenic enlargement, and usually liver enlargement. One female had severe haemorrhages at each pregnancy.

Two patients showed typical mongoloid features. All showed characteristic X-ray changes in the bones.

The blood picture showed haemoglobin percentages of about 8·0 gm. per 100 ml., a low colour index and a low mean corpuscular haemoglobin concentration, thin hypochromic target cells, anisocytosis, poikilocytosis, and stippling, reticulocytosis and normoblasts varying up to 100 per 100 leucocytes, and a moderate leucocytosis. The indirect van den Bergh test showed about 2 mgm. per 100 ml. of serum bilirubin. The bone-marrow showed marked erythroid hyperplasia. Splenectomy in two cases caused no improvement, but a persistent increase in the number of normoblasts.

Group II. There were 5 members of the family in this group, 2 in the second generation and 3 in the third ; in addition one son-in-law had this degree of the disease.

All were free from symptoms and physical examination showed no abnormality. The blood picture showed a normal, or slightly sub-normal, haemoglobin level with red cells above 6 millions per cmm. Numerous hypochromic target cells were seen but the majority of the cells appeared normal. There was anisocytosis and poikilocytosis but only of a moderate degree. The colour index was low. The indirect van den Bergh test was negative.

The bone-marrow showed a moderate erythroid hyperplasia (normoblasts 29 per cent. of the nucleated cells).

There were no changes in the bones demonstrable by X-ray.

[It is difficult to justify the author's claim that cases in this group showed "the characteristic anaemia only", when in fact most of them were not anaemic.]

Group III. The grandfather, 3 children of the second generation, and 5 grandchildren fell into this group.

They showed either a few target cells or red cells with increased resistance to saline concentration. [The author states that in some cases this latter abnormality was only slight so that the subjects would have been passed as normal if there had been no family history ; is it not possible that they were in fact normal ?] *L. E. Napier*

PIRZADA, M. A. & KAPUR, P. N. **Cooley's Anaemia.** *Indian Med. Gaz.* 1951, Apr., v. 86, No. 4, 150–52, 4 figs. on 2 pls.

Hitherto 6 cases of Cooley's anaemia have been reported from India [see this *Bulletin*, 1945, v. 42, 59] ; the authors report another such case.

The patient was a male Punjab Sikh child of $3\frac{3}{4}$ years of age. There was a history of gradually increasing pallor, swelling of the face, and enlargement of the head and later abdomen, over a period of two years, with occasional short bouts of fever.

The facies were suggestive of Mongolism, the spleen and liver were enlarged, and the lymph glands in the neck, axilla and groin were enlarged, firm and discrete. There were only two short bouts of fever during a month in hospital.

The blood picture showed anaemia (haemoglobin—6·2 gm. per 100 ml.), microcytosis and hypochromia (MCV—75·1 $c\mu$: MCH—17·9 $\gamma\gamma$: MCHC—23·8 per cent.), erythroblastosis (normoblasts 44 per 100 leucocytes with polychromasia, poikilocytosis and anisocytosis), leucocytosis (32,300 per cmm.) a normal red cell fragility, and a positive indirect van den Bergh reaction.

The sternal puncture also showed the typical erythroblastic picture—erythroblasts 10 per cent., normoblasts 49 per cent., with granular and non-granular white cells 28 and 12 per cent.

The X-ray picture of the skull bones showed the typical needle-like radiating striations, and the long bones rarefaction and widening of the medulla at the expense of the cortex.

The child improved clinically and haematologically on being given liver and iron, but when seen 6 months later the blood picture had deteriorated.

It is considered that this was a typical case of Cooley's anaemia except that there was no family history of the disease. It is, however, stated that target cells were not reported and the red cell fragility was not decreased.

L. E. Napier

EPIDEMIC DROPSY

LAL, S. B. **Presence of Argemone Mexicana Seeds in Mustard Seeds grown in Bihar.** *Indian Med. Gaz.* 1951, July, v. 86, No. 7, 317–18.

After outbreaks of epidemic dropsy in Bihar State in 1949 and 1950 the author reported that Argemone seeds were found as adulterants of the mustard seeds only in samples imported from other States. This was disputed ; so, in March 1950, district officers were asked to collect samples of mustard seeds from standing plants in the fields, from stocks of dealers on a large scale, and the stocks of mills producing mustard oil. Samples were sent in from 10 districts, 175 samples in all, and only one contained Argemone seeds. Those sending samples said that the two plants were not harvested together in Bihar and that " Argemone seeds were not available in large quantities without much trouble ".

The author concludes that the seasonal incidence of epidemic dropsy in Bihar was due to the fact that importation of seeds from outside occurs about August and September when local sources are becoming exhausted. Since a month or so is needed for extracting the oil and the incubation period of the disease is 2 to 3 weeks, outbreaks of the disease are commonest in the last quarter of the year. *H. Harold Scott*

VENOMS AND ANTIVENENES

McKeown, K. C. **Dermatitis apparently caused by a Staphylinid Beetle in Australia.** *Med. J. Australia.* 1951, Dec. 8, v. 2, No. 23, 772–3.

Staphylinid or rove beetles of the genus *Paederus* are common in Australia, as in other continents such as Africa, India and South America ; although they have been shown to be sometimes injurious to man, no cases seem to have been recorded in Australia.

At the end of 1950, *Paederus cruenticollis* (one of the many species, nearly 1,000, indigenous to Australia) was very prevalent, particularly in parts of New South Wales, possibly because of the heavy rains and floods in those areas.

The author received a specimen of this beetle from a doctor in New South Wales. He reported that many people had been suffering from weals on exposed surfaces, especially the face and neck. These weals were usually 1 to 3 inches long and up to ½ inch wide, with surrounding inflammation. The lesion was considered to be an acute allergic reaction and although there was no direct evidence against the insect, it is suggested that it may have caused the dermatitis. It is also suggested that the linear shape of the lesion was due to squashing and smearing of the insect across the skin ; the area of the lesions was always accessible to the hand. A brief description of the beetle and its habits is given, together with some reference in the literature to its capacity to produce dermatitis. A list is given of some species of *Paederus* recorded as having caused vesication, and their countries of origin. *H. J. O'D. Burke-Gaffney*

Sarkar, N. K. **Action Mechanism of Cobra Venom, Cardiotoxin and Allied Substances on Muscle Contraction.** *Proc. Soc. Exper. Biol. & Med.* 1951, Nov., v. 78, No. 2, 469–71. [12 refs.]

" Cobra venom, cardiotoxin, saponin and drugs of the digitalis series bring about the stoppage of the movements of the excised heart. The cardiac arrest caused by cobra venom, unlike that by saponin and digitalis, is irreversible, *i.e.*, cannot be washed out. Unlike living muscle fibres, glycerinated muscle fibres and actomyosin threads show no contraction under the influence of cobra venom or cardiac drugs. These drugs have no effect on myosin and actin either."

Schöttler, W. H. A. **Para-Specific Action of Bothropic and Crotalic Antivenins.** *Amer. J. Trop. Med.* 1951, Nov., v. 31, No. 6, 836–41. [18 refs.]

" The neutralization of *Agkistrodon, Bitis, Naja, Sepedon* and *Vipera* venoms by anti-bothropic and anti-crotalic sera was examined quantitatively. It was found that these antivenins exert a slight degree of para-specific action on venoms of the genus *Vipera* only. This neutralization is, however, much inferior to that by specific antivenins, so that the once recommended use of South American sera in European snake poisoning is not justified. Some problems of antivenin titration are discussed."

MARQVARD, H. La sérothérapie antivenimeuse. Recherches sur la neutralisation des facteurs de diffusion des venins. [**Antivenene Treatment. Research on the Neutralization of Diffusion Factors of Venoms**] *Rev. d'Immunologie.* 1951, v. 15, No. 4, 262–70. [11 refs.]

These researches have been carried out with *Vipera berus*, the only poisonous snake of Scandinavia. This venom destroys tissues, its known enzymes being phosphatidase, proteolytic enzymes, amino-oxidase, hyaluronidase and others. It contains no neurotoxic factor. The chief symptom it produces in man is a haemorrhagic oedema, varying in extent, usually reaching a maximum in 18 to 24 hours, remaining for 24 to 48 hours, then gradually receding. The local oedema and haemorrhagic effusion are due to the cytolytic action of the poison, to the phosphatidase and proteinase, while the spread of the venom to adjacent tissues is due to the hyaluronidase, but another factor in the necrotic process, probably equally important in the development of oedema, is the increased interstitial pressure.

The author states that the present observations are based on 630 cases of bite by *V. berus* between 1900 and 1948, those up to 1925 not treated by antivenene being considered separately from subsequent patients who received the specific serum. He divides the oedema and necrosis into four degrees : (1) slight and limited to the region round the bite ; (2) first degree—ecchymosis up to the next joint above, elbow or knee ; (3) second degree—spread to involve the whole limb ; (4) third degree—extension to the trunk. Local reaction varied according to the age of the patient ; oedema of the 2nd and 3rd degrees was more common in children under 10 years of age. These degrees are considered in relation to the time elapsing between infliction of the bite and administration of the antivenene. Although 630 cases are mentioned altogether and 277 as presenting only a minimal local reaction when medically examined, various tables presented deal with only 126 receiving antivenene and 34 not receiving it. Most of the former were given 10 cc. subcutaneously. However, despite early administration of the antivenene, the oedema spread in one-fifth of the patients gradually to the whole limb and even to the trunk, although when first seen the oedema was local and limited ; perhaps the amount injected was too small, or, as the author states, the local reaction was really intense and was seen in an early stage [this seems obvious and tautological]. The author concludes that the antivenene injected soon after a bite by *V. berus* can prevent extension of the oedema and diffusion of the necrotizing factors. The diffusion of these factors appears to result from the combined action of hyaluronidase in the venom and increase of the interstitial pressure. Of the substances causing this increase of pressure some are in the venom and their action is checked by the antivenene, others are formed by the tissue reaction *in situ* and are not neutralized by the antiserum. *H. Harold Scott*

SALOU, G. Envenimation par " Echis carinatus " Schn. dans la région de Sokodé (Nord-Togo). [**Poisoning by *Echis carinatus* in Northern Togo**] *Méd. Trop.* Marseilles. 1951, July–Aug., v. 11, No. 4, 655–60.

[It is not easy to follow the author's figures. He states that of 80 patients admitted to hospital at Sokodé, northern Togo, 14 died and 2 others were removed in a " desperate condition " raising the percentage of deaths to 22·5. Fourteen deaths among 80 patients would be 17·5 per cent., and 16 deaths 20 per cent.] Of those bitten by *E. carinatus* 16 died and only one recovered and about this one there were doubts whether the snake was *Echis carinatus*. Four cases are detailed, all ending fatally in spite of administration of antivenene and of energetic local treatment. The symptoms are summed

up by the author under local and general. Much pain and rapid development of oedema occur with, rarely, lymphangitis and enlargement of glands. These local signs become less from the 4th day, but the general systemic disturbance is aggravated. This comprises attacks of syncope, variable temperature which may be above normal, normal or subnormal before the fatal issue. Haemorrhage ceases by the 4th day, or earlier, and gives false hopes, because the anaemia increases ; bleeding may occur, not only at the site bitten, but also from the gums and buccal mucosa, and then maybe haemoptysis and haematuria ; less often haematemesis and melaena and muscular and subcutaneous haematomata. The anaemia is evidenced by pallor of mucosae, tachycardia and dyspnoea. There is never any muscular paralysis. One patient had an early comatose state with relaxation of sphincters. The terminal coma shortly preceding death is ascribed to the cerebral anaemia. *H. Harold Scott*

Giboin, L. M. Note sur la présence et l'importance au Togo d'"Echis carinatus" Schn. [**On the Existence and Importance of** *Echis carinatus* **in Togo**] *Méd. Trop.* Marseilles. 1951, July–Aug., v. 11, No. 4, 661–7.

Apparently *Echis carinatus* was not identified in Togo before the early part of 1951 when the chief of the Veterinary Service was bitten by a snake ; though the head was crushed, the body was identified. The total length was 75 cm., considerably longer than the Indian variety which is, on an average, 45 cm. with a maximum of 60 cm.

E. carinatus is now known to be fairly common in northern and central parts of Togo and is very dangerous ; far more so than in India where the fatality is only 10–20 per cent., while in Togo the bite is nearly always fatal [see preceding abstract]. This may be due to the greater size of the African snake. Its characters are detailed. Rewards are offered for the capture of live specimens in order that an antivenene may be prepared, for that against local *Bitis* and *Naja* is ineffectual for bits by *Echis*. Meanwhile use is being made of lyophilized polyvalent antivenene imported from India and prepared from the venoms of *Naja tripudians*, *Bungarus caeruleus*, *Vipera russelli* and *Echis carinatus*. Other local snakes, *Dasypeltis scaber* and *Psammophis sibilans* are common and the former may, at first glance, be easily mistaken for *E. carinatus*. The author gives a table comparing the two. *H. Harold Scott*

Bulger, J. J. & Northrop, A. K., Jr. **Perforated Duodenal Ulcer following Snakebite.** *J. Amer. Med. Ass.* 1951, Nov. 17, v. 147, No. 12, 1134–5.

A healthy child of 22 months in Montana was bitten by a rattlesnake in each leg. When seen 45 minutes later, it was apparent from the high degree of central nervous stimulation (which is described), that a neurotoxin was present in the venom ; unfortunately the type of snake was not identified.

After appropriate supportive, specific and local treatment, which is recorded in detail, the child appeared to be out of immediate danger in 24 hours. Apart from excessive bowel activity on the first day, the condition improved until the third day, when vomiting began. The abdomen gradually became distended and was soon hard. It was clear that a surgical emergency had arisen : operation revealed the presence of a perforation about 3 mm. in diameter in the first part of the duodenum. Despite the very critical condition, the operation was continued : the child recovered and was discharged on the 18th day.

The authors point out that this peptic ulcer occurred in a completely healthy child and ruptured four days after she had been bitten twice by a rattlesnake. An analogy is drawn with the duodenal ulceration which may occur after severe

burns, and it is suggested that the ulcer in this case was produced through the central nervous system : this view is supported by the profound nervous manifestations seen in the child.

As some 2,000 bites from venomous snakes are said to occur yearly in the United States, the authors suggest that when the clinical sequelae point to the presence of a neurotropic venom (particularly in a small child) the clinician should be on the look out for signs of ulceration in the gastro-intestinal tract, so that possible perforation may be prepared for. *H. J. O'D. Burke-Gaffney*

DERMATOLOGY AND FUNGUS DISEASES

Redaelli, P., Cavallero, C., Borasi, M., Sala, G. & Amira, A. Infezione sperimentale da *Coccidioides immitis* e steroidi corticosurrenali. [**Experimental *Coccidioides immitis* Infection and Cortisone**] *Mycopathologia.* The Hague. 1951, Oct. 30, v. 6, No. 1, 7–14, 2 figs. on 2 pls. [22 refs.]

The English summary appended to the paper is as follows :—

" After the subcutaneous injection of *Coccidioides immitis* Stiles, twenty rats showed a giant cell, fibroblastic granuloma ; no general infection was observed. Treatment with DCA or Artisone did not modify the course and the histological pattern of the infection. On the contrary, in rats treated with Cortisone the infection was more severe, the subcutaneous granuloma showed larger necrotic and exudative foci, no fibroblastic tissue was formed, the fungous growth was conspicuous and visceral lesions were observed. These results are in agreement with the inhibitory effect of Cortisone on the allergic and immune responses and with the catabolic effect of the hormone on protein metabolism."

Ciferri, R. Riferimento del genere *Paracoccidioides* agli Entomoftorali Imperfetti (Entomophthorales Coccidioidaceae). [**Reference of the Genus *Paracoccidioides* to the Family of Imperfect Entomophthorales**] *Mycopathologia.* The Hague. 1951, Oct. 30, v. 6, No. 1, 47–51. [19 refs.]

The English summary appended to the paper is as follows :—

" By comparison between *Paracoccidioides* and *Delacroixia*, the former genus is ascribed to the Family Paracoccidioidaceae (Imperfect Entomophthorales).

" The relationship between the genera of Entomophthorales is discussed, together with the evolutive trend of the group."

Lacaz, C. da S. Notas sôbre a denominação genérica e especifica do agente da blastomicose Sul-Americana. Comentários sôbre uma questão de nomenclatura botânica médica. [**Notes on the Generic and Specific Denomination of the Agent of South American Blastomycosis and of Medical Botanical Nomenclature**] *Mycopathologia.* The Hague, 1951, Oct. 30, v. 6, No. 1, 38–46. [38 refs.]

The English summary appended to the paper is as follows :—

" In this paper, the author justifies the generic denomination Paracoccidioides and the Splendore's species *brasiliensis* to designate the South-American blastomycosis agent. He states that the species *brasiliensis* is perfectly valid and does not infringe any item of the international rules of the botanic nomenclature. He shows that the binomial *Lutziomyces histosporocellularis* must be rejected as superfluous and illegitimate."

NAUCK, E. G. Zur histologie der Chromoblastomycose. (Chromomycose.) [**The Histology of Chromoblastomycosis**] *Gaz. Méd. Portuguesa.* 1951, v. 4, No. 3, 809–16, 6 figs. [14 refs.]

TROPICAL OPHTHALMOLOGY

GIBSON, J. B. G. **The Bacteriology of Conjunctivitis in Queensland.** *Med. J. Australia.* 1951, Sept. 15, v. 2, No. 11, 355–7.

The bacteriology of conjunctivitis in Queensland is compared with the findings in other places.

In 1,000 healthy conjunctival sacs in Queensland the diplobacillus of Morax-Axenfeld, which is a very common inhabitant of the conjunctival sac, was not found in any case. The *Haemophilus* group (Koch-Weeks bacillus and the diplobacillus of Morax-Azenfeld) had a very low incidence in 230 cases of acute or subacute conjunctivitis. The diplobacillus of Morax-Azenfeld did not occur at all in contrast with its high incidence (about 40 per cent.) elsewhere and Koch-Weeks bacillus was found in only 1 per cent. of cases. Temperature alone will not account for the pronounced difference, since the *Haemophilus* group has a high incidence in Egypt. It is doubtful whether angular conjunctivitis due to Morax-Axenfeld diplobacillus exists in Queensland although angular hyperaemia of the bulbar conjunctiva from exposure to dust, wind and glare is common. In view of the high incidence of organisms susceptible to penicillin and sulphonamide drugs, *i.e.*, staphylococci, streptococci and pneumococci, treatment with sulphacetamide and more especially penicillin gave good results. *E. O'G. Kirwan*

DERIAS, L. **A Report on the Effect of Solufontamide Drops in the Treatment of Acute Conjunctivitis.** *Medicine & Lab. Progress.* Cairo. 1951, July–Aug., v. 12, Nos. 7/8, 154–7.

Solufontamide has proved beneficial in the treatment of trachoma by subconjunctival injections (Bierent, Kadir, Hussein and Massouda) and in the form of eye-drops has been used with good results in the treatment of Koch-Weeks conjunctivitis (Kamel).

Derias, using a 33 per cent. solution of Fontamide, treated acute conjunctivitis due to various organisms and instilled 1 to 2 drops 6 times daily after preliminary washing of the eyes with cooled boiled water. Clinical and bacteriological cure occurred by the end of the 4th day and he considers that the treatment is efficient, practical, economical and "should have a first rank place in the treatment of acute conjunctivitis". *E. O'G. Kirwan*

FERRAND, G. & PARLANGE, J. A. Un essai de "traitement de masse" des conjonctivites saisonnières aiguës en milieu rural marocain. [**Mass Treatment of Acute Seasonal Conjunctivitis in Rural Morocco**] *Bull. Inst. Hyg. Maroc.* 1950, v. 10, Nos. 1/2, 37–53.

Mass treatment of acute seasonal conjunctivitis in Morocco was carried out by the authors with 1 per cent. streptomycin drops instilled into the conjunctival sac twice daily. The average duration of treatment to produce a complete cure was 5 to 6 days in most cases and there was no tendency for the disease to relapse. Trachoma and follicular conjunctivitis are not cured by streptomycin therapy, so when these diseases exist as well, sulphonamide drops were used in combination with streptomycin.

Mass treatment by this method can be carried out by non-specialized persons so allowing the ophthalmologists to devote their efforts to the ocular conditions requiring surgical treatment (trichiasis, etc.). The results in different districts are shown in 9 tables. *E. O'G. Kirwan*

POLEFF, L. Importance théorique et pratique du procédé de coloration des corps du trachome au bleu de méthylène citraté. [**Theoretical and Practical Importance of the Citrated Methylene Blue Technique for Staining Trachoma Bodies**] *Maroc Méd.* 1951, Oct., v. 30, No. 317, 823–4.

The author has confirmed his previous experience with the use of " citrated methylene blue " for staining trachoma bodies [this *Bulletin*, 1951, v. 48, 672 ; 1952, v. 49, 312] as a result of studying 1,000 smears from cases of trachoma and 500 control smears. He also confirms that comparable results may be obtained by using acetic or lactic acid or ammonium citrate in place of citric acid in preparing the stain. The " avidity " of methylene blue for trachoma bodies has led him to make a systematic study of commercial preparations of collyria containing methylene blue : he found that all of them produced contrast staining of trachoma bodies if they were applied long enough.

The technique is described again, with observations on the results. It is stated that the staining effects may be obtained with smears a year old and that the contrast stain does not fade after a year, as other stains may do.

The method has proved so successful, so rapid and so constant in detecting trachoma bodies that the author and his colleagues have applied it in a large-scale epidemiological study among schoolchildren in Morocco. The results so far have shown that of 219 children known to have trachoma the characteristic bodies were found in 94·5 per cent. ; but they were also found unequivocally in 42·3 per cent. of those who were apparently healthy or " doubtful ".

It is claimed that it has thus been shown for the first time on a large scale and by direct microscopic examination, that apparently healthy carriers or persons with latent trachoma infections may be present in areas where trachoma is endemic. The importance of this finding from the point of view of prophylaxis is stressed. *H. J. O'D. Burke-Gaffney*

SEZER, F. N. **Tarsitis as a Cause of Sulfonamide Resistance in Trachoma.** *Amer. J. Ophthalm.* 1951, Nov., v. 34, No. 11, 1 508–10. [10 refs.]

" From the point of view of treatment, trachoma may be divided into two groups : (1) Trachoma without tarsitis and (2) trachoma with tarsitis. The first group responds to sulfonamide therapy. The second group fails to respond to any kind of medical treatment."

NGUYÊN DINH CAT. Notes sur le traitement du trachome par l'auréomycine. [**Treatment of Trachoma with Aureomycin**] *Extrême-Orient Méd.* Hanoi. 1951, Jan.–Mar., v. 1 [? v. 4], No. 1, 122–6.

The treatment of 21 cases of trachoma with aureomycin ointment (aureomycin hydrochloride 1·0 mgm. to 1 gm.) is discussed by the author. In the early and active stages of the disease he advocates preliminary curetting of the tarsal conjunctiva with removal of granulations under local 4 per cent. cocaine anaesthesia. This is followed by applications of the aureomycin ointment which are continued twice daily for a few days. The curetting in some cases

may have to be repeated after three days. The author claims that the aureomycin acts directly on the trachoma virus in the tissues. The rapidity of complete cure is remarkable and is brought about by cicatrization of the trachoma process.

The drug is not an irritant or caustic and so is an ideal method of treatment.

E. O'G. Kirwan

BIETTI, G. Les résultats de la thérapie sulfamidique et antibiotique dans le trachome. [**Results of Sulphonamide and Antibiotic Therapy in Trachoma**] *Rev. Internat. du Trachome.* 1948, v. 25, 115–58, 4 figs. [81 refs.]

MISCELLANEOUS DISEASES

FAINE, S. & HERCUS, C. E. **Infections in Rarotonga, Cook Islands.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 341–52, 1 graph. [27 refs.]

In January–February, 1950, the authors examined 365 of the population of the village of Arorangi in Rarotonga, the capital island of the Cook Islands group. Tuberculosis has been stated, on doubtful evidence, to be very prevalent and to cause much sickness and many deaths in the Cook Islands ; in the present survey 53·4 per cent. of people at all ages and 88·5 per cent. at ages over 19 years were Mantoux-positive ; a few persons showed doubtful clinical signs of the disease but no tubercle bacilli were found. Non-periodic filariasis is highly endemic ; it is caused by *Wuchereria bancrofti*, transmitted by *Aëdes scutellaris* var. *pseudoscutellaris*. Microfilariae were found in 37 of 305 blood preparations (15·9 per cent. in males and 8·1 per cent. in females). The Willis floatation technique was used for the examination of 281 specimens of faeces ; infestations with *Ascaris* (57 per cent.), *Trichuris* (74 per cent.), hookworm (38 per cent.) and *Enterobius* (4 per cent.) were found, but they did not seem to affect health adversely. Skin infections included ringworm (26·5 per cent.), scabies (12·1 per cent.) and head-lice (5·2 per cent.) ; no cases of primary or secondary yaws were seen but there were a few scars said to be caused by recent yaws and a few cracked skins of the feet were probably due to tertiary yaws which had been treated. The Wassermann reaction was positive in 44 per cent. of 144 blood specimens examined, but syphilis is said not to occur. Eosinophilia was common (13·5 per cent.) and conjunctivitis also (12·6 per cent.). No proved gonorrhoea was seen, but it was suspected in some cases. Vaccination against smallpox, typhoid and paratyphoid, and tetanus had been done.

J. F. Corson

HERCUS, C. E. & FAINE, S. **The Rarotongan Villagers' Environment.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 353–62, 2 figs.

During a survey in 1950 of the health of the villagers of Arorangi in Rarotonga, Cook Islands, attention was paid to their living conditions ; brief descriptions of the housing, water supply, disposal of excreta, mosquito control, health organization, economic conditions and social welfare are given. The authors concluded that housing conditions were on the whole fairly satisfactory and mosquito control had reduced the numbers of mosquitoes. The water supply was inadequate in many cases and it was exposed to contamination. The Rockefeller latrines had been neglected and needed repair. The Health Organization included a child welfare organization under the Chief Medical

Officer, a District Nurse and the school. The people are poor and wages are low and largely spent on costly imported food. The young people are therefore naturally eager to emigrate to Makatea and New Zealand where wages and opportunities are greater. *J. F. Corson*

GARRY, M. W. & KOCH, Marie L. **Chronic Melioidosis : Bacteriologic and Clinical Correlation in Diagnosis.** *J. Lab. & Clin. Med.* 1951, Sept., v. 38, No. 3, 374–83, 4 figs. [15 refs.]

A case of melioidosis is reported from Wisconsin. The patient, a white man aged 45 years, was acutely ill with jaundice and enlargement of the liver, and had a superficial inflammatory lesion on the inner side of the thigh which extended to involve the root of the scrotum. The lesion eventually broke down to form a granulating ulcer, and sinuses appeared near the scrotum and anus. An organism isolated from the lesion had most of the typical characters of Whitmore's bacillus and produced a Straus reaction in guineapigs. It did not reduce nitrates, and a bluish green pigment diffused into the medium from cultures grown on glycerol agar. Although it had thus some resemblance to *Pseudomonas pyocyanea*, the organism was ultimately considered to be *Pfeifferella whitmori*. It was sensitive to terramycin (about 10 μgm. /ml.) but resistant to aureomycin, chloramphenicol, penicillin, streptomycin and sulphadiazine. The lesions healed and the patient recovered after treatment which included the local application of tyrothricin packs and the oral administration of aureomycin. This is believed to be the first case of melioidosis in a person who had never left the continental limits of the United States. His history included injuries while working in the Chicago stockyards, and possible exposure to rats. *J. C. Cruickshank*

TROWELL, H. C. **Two Cases of Onyalai in Uganda.** *East African Med. J.* 1951, Nov., v. 28, No. 11, 449–52. [12 refs.]

In this paper Trowell describes two cases of onyalai in Africans of Uganda. Hitherto the disease has only been recorded infrequently from East Africa [KEEVILL, Tanganyika, this *Bulletin*, 1938, v. 35, 444 and WELCH, Kenya, *ibid.*, 1921, v. 17, 241]. More recently RIGBY [*ibid.*, 1949, v. 46, 873] reported it in an African from Kenya who had received arsenical injections.

In both Trowell's cases haemorrhagic bullae were present within the oral cavity, and purpura associated with a thrombocytopenia was present.

The first case was that of a male Tesot, aged about 20 years, who suddenly became ill with a severe epistaxis, followed by the appearance of large haemorrhagic bullae on both lips and elsewhere in the mouth. After 10 days another crop of bullae appeared on the inner sides of the cheeks and tongue and later again on two successive occasions. The blood, in addition to a moderate degree of anaemia, revealed a severe thrombocytopenia (19,000 platelets per cmm.) with a bleeding time of 15 minutes. The case was regarded as a mild one of onyalai. On admission, the patient had large " papillomatous masses " on the tongue, which sloughed within 5 days. [The nature of these masses is not clear.] The patient made a good clinical recovery.

The second case was in a Ganda female child about 2 years of age. There was a previous history of attacks of fever from the 9th month, associated with splenomegaly for which she received quinine. At the age of 1 year, an attack of dysentery occurred. From then until the present illness she had enjoyed good health.

The illness commenced with a small blood blister on the lower lip, followed the next day by a large haemorrhagic vesicle on the inside of the left cheek.

Soon purpuric spots appeared on the body. For a week there was a mild oozing from the nose. The child was somewhat febrile and malaria parasites were demonstrated in the peripheral circulation. In addition to a severe anaemia, there was a marked thrombocytopenia, the platelets being 14,600 per cmm. and the sickle-cell trait was demonstrated. After a critical illness of about a week's duration, the haemorrhages slowly ceased and the general condition of the child improved considerably.

Trowell, in discussing the aetiology of the disease, significantly remarks :— " It therefore appears that there might be a tendency among certain Africans, suffering from any variety of thrombocytopenic purpura, to develop large haemorrhagic bullae in the mouth ".

This view is similar to that expressed by Jelliffe in West Africa [this *Bulletin*, 1950, v. 47, 495]. Possibly the bleeding in Trowell's second case was precipitated by the malarial infection. *M. Gelfand*

PROTOZOOLOGY : GENERAL

Schrader, E. A. & Westphal, A. Zur Ätiologie der Endangiitis und Arteriosclerosis obliterans. [**The Aetiology of Endangiitis and Endarteritis Obliterans**] *Klin. Woch.* 1951, Jan. 1, v. 29, Nos. 1 /2, 19–20.

The nature of the diseases known collectively as endangiitis is still unknown. From the study of 100 cases the authors found that in practice this condition is first diagnosed when the occlusions produce changes in the blood flow. Their observations have also indicated that the formation of these occlusions may take months or years, during which the patient shows no recognizable symptoms. The authors point out that there is a certain parallelism between endangiitis and the latent form of toxoplasmosis, in both of which there is also a tendency for calcification. Moreover, since toxoplasmic infection may involve a variety of tissues and organs, and the parasites may find their way into the blood stream, it is conceivable that they may also develop in the walls of blood vessels, giving rise to lesions like those in endangiitits. From these considerations it seemed that there might be some relation between the two diseases.

This hypothesis was investigated by applying the Sabin-Feldman dye test for toxoplasmosis in 52 male patients showing symptoms of endangiitis in the lower extremities. In 13 cases (25 per cent.)—of which 11 were suffering from endangiitis obliterans and 2 from endarteritis obliterans—the reaction was positive, while in 49 controls, who manifested no signs of arterial disease, only one reacted positively. Further evidence of the correctness of the diagnosis of toxoplasmosis was provided by treatment with aureomycin of 3 patients with a positive dye-test to titres of 1 : 50, 1 : 50 and 1 : 200 respectively. After treatment, the titre of the dye-test in these three cases of endangiitis fell to zero.

In an appendix, the authors describe an experiment in which the occluded portion of the femoral artery of a patient, who was suffering from endangiitis obliterans and had a dye-test titre of 1 : 50, was teased up in saline, and the suspension was inoculated intracutaneously and intraperitoneally into 2 rats and 2 hamsters, all of which—as well as 4 corresponding control animals—reacted negatively to the dye-test. Four weeks after inoculation the 4 animals reacted positively to the dye-test with titres from 1 : 400 to 1 : 600, whereas the controls remained negative.

It is concluded that the cases of endangiitis in question were infected with *Toxoplasma*. *C. A. Hoare*

LWOFF, André [Edited by]. **Biochemistry and Physiology of Protozoa.**

This book is reviewed on p. 459.

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

SOLOMON, M. E. **Control of Humidity with Potassium Hydroxide, Sulphuric Acid, or other Solutions.** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 543–54, 1 fig. [23 refs.]

The chief purpose of this paper is to provide convenient access to up-to-date and accurate data on solutions useful for humidity control which have become available since the publication of the well-known papers on this topic by BUXTON [this *Bulletin*, 1932, v. 29, 128] and BUXTON and MELLANBY [*ibid.*, 1934, v. 31, 739]. Three methods of preparing solutions of graded density are described, namely by hydrometry, and the use of gravimetric and of volumetric methods. The advantages and disadvantages of the use of sulphuric acid solutions over those of sodium and potassium hydroxide are discussed. Points are mentioned that must be observed in their use, and in the use of saturated salt solutions, to obtain accurate atmospheric relative humidity control.

Data more recent than those given in the International Critical Tables of 1928 are reviewed, and used as the basis of tables giving the concentration (wt. per cent.) and densities corresponding to relative humidities, for potassium hydroxide and sulphuric acid solutions. Sources of similar data are given for calcium chloride, sodium hydroxide, sodium chloride and glycerol solutions. Some figures are also produced which are more recent than those appearing in a review (1948) which the author quotes on the humidities in contact with various saturated salt solutions. *Thomas E. Fletcher*

SPEAR, P. J. **Disposable Insect Cages.** *Soap.* New York. 1951, Oct., v. 27, No. 10, 143, 153, 3 figs.

Cages used for exposing insects to insecticides are usually difficult to clean, or expensive to replace. The author describes the construction of two types of cage which can be discarded after use. Fabric cages may be constructed from tarlatan cloth sewn to give a rectangular bag, the open end of which is stapled to a square of cardboard with a door kept closed by friction. These cages are quite rigid owing to the sized material and may be used for exposing houseflies or cockroaches to vapours or aerosols. Cup cages constructed from 5-ounce paper drinking cups with the bottoms removed and replaced with cheesecloth may be used for exposing flies to residual deposits of insecticides. Flies are counted into the cups, the treated surface is placed over the open end and finally the cage and treated surface is inverted. By this method, however, the flies are not confined to the treated surface alone and may walk over the untreated sides of the cup for a considerable time. *C. Mary Harrison*

Senior-White, R. A. & Lewis, G. **Key to the Anopheline Larvae of Trinidad and Tobago.** *Caribbean Med. J.* 1951, v. 13, Nos. 3/4, 151–2, 2 figs. on pl.

Lawson, J. W. H. **The Anatomy and Morphology of the Early Stages of** *Culicoides nubeculosus* **Meigen (Diptera : Ceratopogonidae = Heleidae).** *Trans. Roy. Entom. Soc. of London.* 1951, Dec. 28, v. 102, Pt. 9, 511–70, 46 figs. & 1 pl. [52 refs.]

Micks, D. W. & Ellis, J. P. **Free Amino Acids in Adult Mosquitoes.** *Proc. Soc. Exper. Biol. & Med.* 1951, Oct., v. 78, No. 1, 69–72, 1 fig.

Studies of the amino-acid content of adult mosquitoes have been made by the method of paper chromatography, after extraction with alcohol. It was thought that such studies might reveal differences between species which could be related to their different susceptibility to infection with the malaria parasite.

Unfed female mosquitoes, two to three days old (of the species *Anopheles quadrimaculatus*, *Culex pipiens*, *C. quinquefasciatus* [*fatigans*], *C. salinarius*, *Aëdes aegypti*, *Aëdes sollicitans*, and *Culiseta inornata*), were used. The amino-acids found were alanine and beta-alanine in relatively large amounts, glutamic acid, leucine and isoleucine in lesser amounts, and, in small amounts, taurine, proline, histidine, serine, valine, methionine, threonine, lysine, arginine, aspartic acid, glycine, tyrosine and tryptophan. This is the first report of tryptophan in Diptera. Cystine was not found, although it has been shown to be an essential constituent of the larval diet of *Aëdes aegypti*.

There was no qualitative difference in amino-acid content between the different mosquito species, but it was found that the amounts of most of the amino-acids was much less in *Anopheles quadrimaculatus* than in the other species. In the amounts and proportions of amino-acids the three *Culex* species differed negligibly from one another, as did the two *Aëdes* species.

A. J. P. Goodchild

Brown, A. W. A., Thompson, R. P., Twinn, C. R. & Cutkomp, L. K. **Control of Adult Mosquitoes and Black Flies by DDT Sprays applied from Aircraft.** *Mosquito News.* 1951, June, v. 11, No. 2, 75–84, 6 figs.

Experimental air-spraying of DDT was carried out over an area of 19 square miles round the airport at Goose Bay, Labrador, to investigate this method of reducing the mosquito nuisance. The most troublesome species were *Aëdes punctor*, *Aëdes implacabilis*, *Aëdes communis* and *Aëdes pionips*, which breed in the boggy areas and pools in the forest surrounding the air base. The spraying was done at the end of June, just before the mosquitoes reached their maximum numbers.

The area was divided into blocks of about 2 square miles, each block being treated at a single flight. Spraying was done at night when there was no air temperature gradient. The blocks were sprayed in swathes 200 yards wide, indicated by luminescent markers, by an R.C.A.F. Dakota Mk. I flown at 140 m.p.h. The insecticide used was a DDT concentrate in trimethylnaphthalene diluted with fuel oil to give a 4·2 per cent. solution. Six hundred gallons of this were carried in auxiliary fuel tanks with outlet to a single central emission pipe fed by gravity. Tests with an emission pipe fitted with an " air scoop " gave no better results than a simple outlet. The output of liquid was about 1 gallon per second and this gave an overall average dosage of 0·165 lb. DDT per acre. The drop spectra collected at different points from the path of flight are given in tables (mass mean diameter about 400 microns ; arithmetic mean 80–90 microns).

Effects on the mosquitoes were determined by their settling rates and biting rates on observers walking about the treated blocks on 4 different dates before and 4 after treatment. It was found that, over the period of 4th July to 26th, the landing rate and biting rates were reduced to one-fourth and one-sixth respectively, as compared with unsprayed areas. Effects on the black-flies were rather more difficult to judge because influx of adults from far away obscured the effect of the treatment. A big increase was noted in the untreated, control area, and the treated zone remained below the control for 2–3 weeks. Elsewhere, air-spraying with DDT reduced the blackfly population by about 70 per cent. on the day following treatment. *J. R. Busvine*

BARANYOVITS, F. **Fly Reactions to Insecticidal Deposits: a New Test Technique.** [Correspondence.] *Nature.* 1951, Dec. 1, 960–61.

The majority of laboratory tests with residual insecticides against house-flies involve crowding flies on to a small treated surface, thus stimulating them to abnormal activity and probably causing them to pick up greater amounts of insecticide than they would under field conditions. This difficulty has been overcome by exposing one fly at a time in a 2 ft. cube cage, the back of which is of paper treated with insecticide. The fly is encouraged to rest on the treated surface by tapping the cage and the time is recorded when the fly leaves the surface and when "knock-down" occurs. After exposure the fly is transferred to a clean cage for observation.

By this test method it was found that flies exposed to gamma BHC deposits do not leave the treated surface until they have acquired a lethal dose, whereas flies on DDT deposits tend to leave the surface quickly, apparently because of the irritant effect of the DDT, and usually survive. Such differences in behaviour are clearly of importance in the field. *C. Mary Harrison*

HOFFMAN, R. A., ROTH, A. R. & LINDQUIST, A. W. **Effect on House Flies of Intermittent Exposures to Small Amounts of DDT Residues.** *J. Econom. Entom.* 1951, Oct., v. 44, No. 5, 734–6.

It is well established that DDT-resistant flies can convert DDT to a non-toxic product, and also that susceptible house-flies can metabolize at least small amounts of DDT. The authors carried out experiments in which house-flies were exposed intermittently to DDT residues to determine whether flies were capable of detoxifying the insecticide in the intervals between the exposures.

The greatest kill both among susceptible and DDT-resistant flies was obtained when the intervals between exposures to the DDT deposit were short. The differences between the kills after short and long intervals between exposures, however, were not so marked with resistant as with susceptible flies. Thus, providing that there are several hours between exposures, both susceptible and resistant flies are capable of detoxifying DDT. Non-resistant flies which had been exposed on 3 consecutive days to a DDT deposit of 0·2 mgm. per sq. ft. and on the fourth day to 0·5 mgm. per sq. ft. succumbed more readily than untreated flies, suggesting that some toxic by-product was accumulated in the previous exposures. A similar result was obtained with DDT-resistant flies.

As the time interval between exposures of non-resistant flies to DDT deposits was increased, the total exposure time for paralysis (knock-down) of 80 per cent. to occur was increased; for instance, when 24 hours intervened

between exposures, the time required for 80 per cent. knock-down to occur was 202 minutes, but when the interval between exposures was only 1 hour, knock-down occurred in 42 minutes.

DDT-resistant flies absorbed approximately the same amount of radio-active DDT whether they were exposed intermittently or continuously to the deposit. There was, however, considerably higher survival among those flies which were given rest periods between exposures. *C. Mary Harrison*

Mitlin, N., Nelson, R. H. & Gersdorff, W. A. **Toxicity to House Flies of TDE Ethyl Analog and Heptachlor.** *Soap.* New York. 1951, Nov., v. 27, No. 11, 139, 143.

Experiments with two new chlorinated hydrocarbons, the ethyl analogue of TDE, and heptachlor 70–30 (mixture of heptachlor and an unidentified isomer of chlordane) were made against house-flies to determine their insecticidal value. The dose required to kill 50 per cent. of flies was estimated from tests with the Campbell turntable method, and comparisons were made with pure *p-p'* DDT, heptachlor, and pyrethrins. The ethyl analogue of TDE was $\frac{1}{5}$ as toxic as DDT, considerably less toxic than heptachlor and very slightly more toxic than pyrethrins to house-flies. Heptachlor 70–30 was approximately half as toxic as heptachlor, slightly more toxic than DDT and considerably more toxic than pyrethrins. *C. Mary Harrison*

Hack, W. H. Contribución al estudio de los tabánidos argentinos (Diptera). [**Study of Argentine Tabanids**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 157–84, 59 figs. (14 on pl.) [29 refs.] English summary (9 lines).

Wygodzinsky, P. Notas sobre Cimicidae de la República Argentina (Hemiptera). [**Notes on Argentine Cimicids**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1951, Aug., v. 3, No. 2, 185–97, 50 figs. English summary.

Rageau, J. Ixodides du Cameroun. [**Ixodid Ticks of the Cameroons**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 441–6. [29 refs.]

The following list of Ixodid ticks of the Cameroons is based on earlier records and also recent collections, principally from domestic animals, by the author and others in the French Cameroons and by workers from the Liverpool School of Tropical Medicine in the British Cameroons : *Rhipicephalus sanguineus, R. capensis longus, R. ziemanni, R. simus simus, R. simus senegalensis, R. planus complanatus, R. evertsi,* and *R. appendiculatus* ; *Amblyomma variegatum, A. splendidum, A. paulopunctatum, A. cuneatum, A. tholloni, A. nuttalli* and *A. cohaerens* ; *Aponomma transversale* ; *Hyalomma transiens, H. impressum, H. detritum* and *H. brumpti, Haemaphysalis leachi* and *H. parmata* ; *Boophilus decoloratus* ; *Dermacentor circumguttatus* ; *Ixodes rasus.*

R. maculatus, Amblyomma hebraeum and a few other ticks formerly recorded for the Cameroons were not represented in the recent collections. Misidentifications in the past may account for some of these unconfirmed records.

The veterinary significance of several species of ixodid is noted ; the list includes several known vectors of disease to animals elsewhere, but nothing has been done to demonstrate their importance in the Cameroons.

Several cases of *fièvre boutonneuse* occur annually in the French Cameroons at the beginning of the dry season (December–January). *R. sanguineus* and *Haemaphysalis leachi* are probable vectors.

No collections were made of argasid ticks. *D. S. Bertram*

Hass, H. B., Neher, M. B. & Blickenstaff, R. T. **Nitro Alkane Derivatives related to DDT.** *Indust. & Engineering Chem.* 1951, Dec., v. 43, No. 12, 2875–8. [12 refs.]

McIntosh, A. H. **Particle Size of Insecticidal Suspensions and their Contact Toxicity. IV. Mechanisms of Action of Different-Sized Particles.** *Ann. Applied Biol.* 1951, Dec., v. 38, No. 4, 881–98. [78 refs.]

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Rockefeller Foundation. International Health Division. **Annual Report 1950.** pp. xiii+211, 18 figs. on 10 pls. New York: 49 West 49th Street.

The report marks a stage in the growth of the Rockefeller Foundation in that the International Health Division is coming to an end, to be replaced by the Division of Medicine and Public Health which will follow a line of policy materially different from that of the past. In consequence the malaria programme as well as the work in other diseases was in the nature of a withdrawing action, and the Division's co-operation in the campaign against yellow fever is marked as definitely in its final stages. The activities reported on are, as always, ambitious, diverse and of great scope, but they reflect the change in that many of them have a valedictory flavour and the new lines of work are, as yet, inadequately drawn out.

The Foundation's work on yellow fever has been brought together in book form, the preparation of which has been a major task [this *Bulletin*, 1952, v. 49, 337]. Work continued during the year in the form of entomological and virus studies, which include the development of a scratch vaccine, and an active part has been taken in campaigns in several parts of America and Africa. The study of other viruses as a development from the yellow fever work has become of major importance, as there is evidence that many that infect man may have their fundamental reservoir in the arthropods and lower mammals in tropical forests. A considerable collection of these viruses has been made, they are maintained in constant culture and they have been the subject of elaborate fundamental studies. Progress in malaria control which the Foundation has done so much to foster is ably reviewed with particular reference to eradication schemes, leading up to a brief statement of the Sardinian experiment.

Although it is not likely that complete eradication has been achieved the statement, made with some degree of assurance, that by gradual attrition over a period of years eradication is possible, makes cheering reading.

The field works have been matched by laboratory studies on many aspects of the metabolism, genetics and culture of the plasmodium, and the methods for the testing of drugs.

The forms of aid to State and local health services and to public health education in general were of the now well recognized character, and are remarkable only for their generosity and wide application. Public health engineering and public health nursing are given greater emphasis than in the past, but most of the assistance is still towards education of the administrator and to technical studies.

The report closes with a balance sheet for the years 1913–1950 which in the closing year of the International Health Division deserves special mention for the vastness of its generosity. Of 93 million dollars expended, the largest expenditure, 23 millions, has been on the maintenance of the field services which have left their mark all over the world. Twenty-two millions have been devoted to the control and investigation of specific diseases, of which the most prominent have been yellow fever, malaria, hookworm and tuberculosis. Though the sum is large it is paltry when ranged against the value of the results for the world. Ten millions have been spent on public health education, the greater part of it on fellowships and such like, though individual schools received very material grants, while the contribution to state and local services of 8 million dollars must have changed their character almost throughout the world.

It is a pity that the International Health Division is closing, even though its work is to be taken over by the new division, as it has a record in the field of public health with which no comparison can be made. *G. Macdonald*

Afrique Occidentale Française. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1949 [Durieux, C.]. [**Technical Report of the Pasteur Institute in French West Africa in 1949**] 82 pp. 1951. Dakar : Grande Imprimerie Africaine.

The Report of the Institute for 1948 was reviewed in this *Bulletin*, 1951, v. 48, 417.

The present report records a total of 47,776 routine investigations (37,921 in 1948). Of these, bacteriological examinations accounted for over 13,000 and serological for nearly 16,000.

Vaccines and biological products amounted to over 8 million doses or cc., of which 7,886,300 were yellow fever vaccine. Some 4½ million people received yellow fever vaccine in 1949. Since 1939, when immunization by scarification began, there have been nearly 29 million inoculations for a population of 17½ million in French West Africa and Togo. For the first time in 22 years, no case of yellow fever in man was reported. This success has caused other countries to seek the Dakar vaccine for this purpose.

In 1949, the Institute began preparing lyophilized BCG vaccine, with a view to general application of BCG vaccination in French West Africa, which is not possible with the aqueous vaccine because of its limited keeping power. Preliminary tests in children in Dakar of 1 to 15 years showed that allergy was acquired in more than 80 per cent. of cases within 2 to 3 months. It was therefore decided to undertake systematic BCG vaccination of all schoolchildren in the Federation in 1949–50.

Studies on yellow fever and BCG are discussed in detail in separate chapters of the report. These include accounts of protection tests in man and animals, statistical results and details of preparation and use of BCG vaccine.

There were 33 persons treated for rabies in the Institute in 1949, 18 Europeans and 15 Africans. Full tabulated details are also given for 1948, when there were 23 treatments at the Institute (6 European, 17 African) with no paralytic accidents or deaths. In out-stations, there were 495 treatments during the same period (65 Europeans, 430 Africans). There were no paralytic accidents, but 3 Africans died of rabies. Details are given of these and of some other cases.

Special investigations recorded in the report have already been published elsewhere and some of them abstracted in this *Bulletin*. The number of publications by members of the staff amounted to 17.

H. J. O'D. Burke-Gaffney

ZENT. F. BAKT. I. Abt. Orig. 1951, Aug. 8, v. 157, Nos. 1/2, 1–45, 1 fig. Bericht ueber die 4. Tagung der Deutschen Gesellschaft für Hygiene und Mikrobiologie in Hamburg vom 27. bis 29. September 1950. [**Report of the Fourth Session of the German Society for Hygiene and Microbiology**]

This number of the *Zentralblatt* is devoted to a report of the 4th Session of the German Society for Hygiene and Microbiology, held in Hamburg in September, 1950. The material contained in the first 45 pages concerns subjects of special interest to readers of this *Bulletin*. Each paper is presented by a well-known authority on the particular subject and each subject is followed by a discussion : the names of those participating will be very familiar to readers, for they include distinguished German and other experts who have themselves contributed largely to the subjects which they discuss. The first two papers, with the discussion on malaria, occupy some 24 pages. REICHENOW reviews the developments in the parasitology of malaria over the last 50 years and covers familiar ground. KIKUTH deals similarly with the chemotherapy of malaria in the last 25 years, from the introduction of plasmoquine to the development of the newer synthetic anti-malarials.

A short note is given by MATHIS on the work of Carlos FINLAY, that distinguished Franco-Scot in Spanish America who was a pioneer of yellow fever research. The epidemiology of jungle yellow fever in South America is discussed in a brief review by Levi CASTILLO with special reference to the vector mosquitoes. Fraga de AZEVEDO contributes a brief note on the study of Q fever in Portugal by Prof. FONSECA and his colleagues and LIPPELT discusses special points on the serological aspects of the rickettsial diseases, with special reference to Q fever. WESTPHAL reviews the subject of toxoplasmosis in Germany in a short paper. WIGAND presents a note on four papers dealing with the study of *Bartonella muris*. There is a description by BRANDIS and PÖHN of methods of making permanent preparations of amoebae. In a few lines KLEINSCHMIDT refers to his work on the electron microscopy of trypanosomes and MINNING similarly refers in two pages to his work with VOGEL on the serological diagnosis of trematode infections.

It will be seen that the papers are mainly reviews of work by these well-known authorities, whose original papers have been largely abstracted in this *Bulletin*.

H. J. O'D. Burke-Gaffney

ARETAS, R. Mission aux Iles Kerguelen. Été austral 1949–1950. [**Mission to the Kerguelen Islands, 1949–1950**] *Méd. Trop.* Marseilles. 1951, Sept.–Oct., v. 11, No. 5, 811–30.

BOOK REVIEWS

LAPAGE, Geoffrey [M.D., M.Sc., M.A.]. **Parasitic Animals.** pp. xxi+351, 113 figs. (48 on 8 pls.) 1951. Cambridge : University Press. [21*s*.]

It is sometimes suggested that medical and veterinary parasitologists are specialists primarily interested only in those creatures which cause harm to man or to his domestic stock, and that consequently the knowledge of such parasitologists, although extensive and sufficient for their immediate purpose, is liable to be disjointed and lacking in natural sequence. Dr. Lapage, a medical man working with veterinary colleagues, has extended his observations well beyond such narrow limits, and has written an unusual and stimulating

book which is not confined to creatures of medical and veterinary importance only ; indeed, it emphasizes the comparatively insignificant part played by man and his domestic stock in the full range of animal parasitology.

The wide scope of this small book—it contains some 350 pages of print illustrated with 113 figures—may be conveyed by brief references to the contents of the eleven chapters. Chapter i is entitled " What is a parasitic animal ? ", and the author's somewhat unorthodox answer to his own question summarizes the contents :—" A parasite is a living organism which establishes a physiological association with another living organism, usually belonging to a different species and usually bigger and stronger than the parasite, which is called its host, the parasite living either on the surface of, or inside, the body of the host and inflicting upon it some degree of injury, against which the host reacts in various ways." Chapter ii describes how the parasitic animal makes contact with the host and how it may enter by the mouth or anus, by the openings of the respiratory, renal or reproductive organs, or through the surface of the skin. Having discussed these routes of entry, the author then considers the various ways in which the parasite or its progeny leaves the body of the host.

Chapters iii and iv are devoted to representative life histories of various parasites, illustrated with numerous photographs and diagrams. Chapters v and vi deal with the effects of parasitic life upon the parasitic animal, the various modifications caused by parasitic life being considered under the following headings : (*a*) methods of feeding ; (*b*) attachment to the host ; (*c*) reduction or loss of organs ; (*d*) modifications of the reproductive processes ; (*e*) correlations of the life history of the parasitic animals with that of the host. Chapter vii deals with the effects produced by parasitic animals upon their hosts, and describes the tissue reactions and the types of resistance which may be developed in the host to various species of parasites. This chapter closes with a discussion of the nature of innate and acquired resistance to the effects of parasitic animals. Chapter viii describes the effects, other than those already mentioned, which the parasite may produce in the host, such as (*a*) mechanical effects caused by the parasite in the tissues of the host ; (*b*) introduction into the host of other kinds of parasitic animals of bacteria or viruses ; (*c*) the production by parasitic animals of substances injurious to the host ; (*d*) the power of parasitic animals to reduce the host's resistance to other species of parasites ; (*e*) the power of the parasite to consume the host's food or abstract important ingredients from it ; (*f*) the power of the parasite to rob the host, not only of food but of other substances essential to good health. This chapter ends with a description of how the parasitic animal may seriously affect the life of communities of animals, including human communities.

Chapter x, which, in the opinion of the reviewer, is one of the most interesting in the book, begins by describing how animals without reasoning powers, but with highly developed instincts, avoid the attacks of parasites or seek to destroy those which they have failed to evade. From this the author goes on to discuss the way in which intelligent man has evolved schemes to evade or destroy the parasite. Chapter xi is devoted to an ethical discussion of the harm done by parasites and emphasizes that the parasitologist's attitude should be not to regard all parasites as degenerate enemies worthy of destruction, but rather of detached interest in a general problem affecting the balance of nature in a world where man and his domestic stock are a very small part of the total population.

It has already been stated that this is an interesting and stimulating book, which, in the space of 350 pages, ranges over a wide field of parasitology. Possibly it is the need for condensation which has led Dr. Lapage to include many generalizations which, although accepted by some authorities, are dismissed by others on the grounds that they lack scientific proof. Perhaps it

might be a fairer criticism to say that the author sometimes accepts as fact certain oft-repeated statements when it would be more accurate, and certainly more cautious, to write that " some persons believe " or that " it is generally accepted ". To quote three examples, all occurring in the same chapter : (*a*) writing of malnutrition, the author states that " It must be one of the main causes of the breakdown of human resistance to parasitic animals, and certainly it is one of the main causes of the breakdown of the resistance of our domesticated animals to them " (p. 214) ; (*b*) concerning susceptibility to malaria, he states that " Parasitic protozoa against which age-resistance may develop include some species of them which attack man. Thus human children are more susceptible to the malarial parasite, *Plasmodium vivax*, which causes benign tertian malaria " (p. 215) ; (*c*) an equally definite statement is made regarding the alleged power of the African to resist certain helminth infections : " In addition to the age of the host, its *genetic constitution* or the *race* or stock to which it belongs may have an important effect upon its resistance to certain species of parasitic animals. Thus negroes are more resistant to infestations with the hook worm, *Ancylostoma duodenale*, than white races are ; and there is evidence that they may resist better than white races do the effects of the human threadworm, *Enterobius vermicularis*, the large roundworm of man, *Ascaris lumbricoides*, and the dwarf tapeworm, *Hymenolepis nana* " (p. 218). The reviewer is aware that all the above statements have appeared previously in text-books, but he knows of no convincing scientific evidence in their support.

Dr. Lapage's work, as might be expected from such an authoritative writer, is free from mis-statements of fact. Nevertheless, there are a number of slips which are misleading, even when they are corrected in other parts of the book. (*a*) On page 23, for instance, referring to *Fasciola hepatica*, the author writes " Although in Britain it can use only one species of snail (*Limnaea truncatula*) as its intermediate host, in other countries it can use other snails ", on page 78 it is correctly stated that full development can take place in species other than *L. truncatula*. (*b*) On page 90, referring to the distinction of *Taenia saginata* from *T. solium*, he states that " this species resembles the beef tapeworm in appearance and structure, but its immature segments are broader than they are long, the egg-laden ones being the reverse—longer than they are broad " : this is not a constant difference and is therefore quite unreliable. (*c*) On page 175, he writes : " The larvae of *H. microstoma*, which are parasitic in the blood-sucking stable-fly, *Stomoxys calcitrans*, are not injected into the horse when this fly sucks blood, but break out of the fly's proboscis, much as the infective larvae of filarial roundworms break out of the proboscis of mosquitoes, and then enter the horse through the wound made by the bite of the fly " ; this statement gives the false impression that the larva of *H. microstoma* can undergo full development after it has penetrated the tissues in the way described. (*d*) On page 228, he writes : " Rats may infect themselves with *Trypanosoma lewisi* by rubbing the droppings of the rat fleas, which are the intermediate hosts of this trypanosome, into the irritating bites of the fleas " —a misleading statement in view of the fact that no other reference is made to the life-cycle of *T. lewisi*. (*e*) On page 232, the author states that " the ciliate protozoon, *Balantidium coli*, which is parasitic in the large intestine of man and pigs, probably feeds directly on the tissues and red blood cells of its hosts ". Admittedly this is true of the human host, but surely it is not true of the porcine host ? (*f*) On page 263, he writes : " Myiasis may be caused by flies which lay, not eggs, but larvae upon the host's surface. An example of them is *Auchmeromyia luteola*, which is related to the house-flies. The larva of this fly is called the Congo floor maggot. It hatches on the floors of huts or in sand and enters the skin of people who sleep on uncovered floors or on the bare earth ". Although the mis-statement regarding *A. luteola* being

larviparous is corrected in the same sentence, there still remains the error that *A. luteola* causes myiasis by entering the skin.

These are minor blemishes and do nothing to lessen the value of a book which is clearly intended as a contribution to thought-provoking studies, rather than as an addition to the many existing text-books essential to students working for examinations or to graduates called upon to identify and advise on particular parasites.

The reviewer has considered this work at length because he believes that Dr. Lapage has written a fascinating and valuable book which presents parasitology to medical and veterinary workers in a new light, and which illustrates and makes interesting much of the information contained in larger and, alas, duller text-books. *R. M. Gordon*

Pavlovsky, E. N. **Rukovodstvo po parasitologii čeloveka.** [Manual of Human Parasitology] Vol. II, pp. 527–1022, figs. 376–618, pls. 11–36 (3 coloured). 5th Edition. 1948. Moscow-Leningrad. [Published by the Academy of Sciences of U.S.S.R.] [43 Roubles.]

The first volume of the 5th edition of this textbook, comprising protozoology and helminthology, has already been reviewed in this *Bulletin*, 1947, v. 44, 376. As the present volume was ready for the press in 1940, the author did not revise the text but brought it up to date by adding to it the most important advances made in the intervening years. The book is devoted to medical arachnology and entomology, with special reference to the vectors of transmissible diseases. Special prominence is given to those arachnids and insects which are encountered within the Soviet Union and are of medical and public health importance in that country, while those which serve as vectors of diseases outside Russia (like tsetse-flies and reduviid bugs) are more briefly dealt with. In all cases, a systematic description of the arthropods is given, followed by a consideration of their bionomics, epidemiological significance and methods of control. There are a number of useful keys for the identification of species of important vectors : these include mosquitoes, sandflies and Ixodid ticks. Of general interest is a chapter in which the author fully develops his concept of the focal distribution of the arthropod-borne diseases of man [see this *Bulletin*, 1946, v. 43, 65]. The book is adequately illustrated by figures (including coloured plates) of the vectors, their breeding places, reservoir hosts and typical sites of disease, as well as diagrams. There is a detailed bibliography and a number of classified alphabetical indexes.

The completion of this comprehensive treatise—by a leading authority who has made numerous original contributions to the subject—places in the hands of Russian workers (and those conversant with this language) a valuable text and reference book of medical parasitology. *C. A. Hoare*

Lwoff, André [Edited by]. **Biochemistry and Physiology of Protozoa.** Vol. I. pp. x+434, numerous figs. 1951. New York : Academic Press Inc., 125 East 23rd Street. [$8.80]

In this series on the "Biochemistry and Physiology of Protozoa" the editor, A. Lwoff, has undertaken an onerous but timely task in an attempt to make readily available the data, indicated by the title, at present scattered throughout the literature. As a result of recently awakened interest in protozoology the subject has expanded to such an extent that a review from all angles becomes increasingly difficult. A precise definition of Protozoa is not easy but briefly they are to be regarded as relatively large protists, generally motile

at certain stages in the life-cycle, with cystic membranes, when present, outside the body and devoid of chlorophyll. It is pointed out in the foreword that " these organisms have evolved in many divergent directions and this evolution has led to a great variety of morphological and biological types ". Physiological evolution has been characterized by loss of certain synthetic functions.

During the war years much effort was devoted to studies of the biochemistry of types parasitic in man and animals and this has added considerably to the literature on the subject. In the case of malaria parasites, which have probably been most intensively studied, only those enzyme systems and metabolic characters common to other organisms have been encountered. Environmental requirements of the parasites were found to be highly specific, depending on the stage of the life cycle and on the species studied. With regard to Protozoa in general, however, data on nutritional needs, metabolism and growth are relatively scanty in relation to those available for bacteria. In the first chapter by the editor himself on " Introduction to Biochemistry of Protozoa ", with sections on origins, biochemistry, nutrition, energy sources and evolution of Protozoa, there is much to stimulate thought. His suggestion on p. 5 that " It would be of great importance to establish in at least one protozoan something like Meyerhof's scheme of sugar metabolism ", has surely been realized for the malaria parasite as the result principally of the studies of Evans and colleagues in America. A review of the comparative biochemistry of Protozoa is projected for the next volume.

In an article of some 90 pages S. H. Hutner and L. Provasoli deal with " The Phytoflagellates " from many aspects, and on a knowledge of them, according to the authors, is based an understanding of the Protozoa. Experimental studies are described which provide an insight into the evolutionary processes concerned with the origin of this phylum. Those seeking orientation as a preliminary to biochemical studies in this field will welcome the review. In the chapter by M. Lwoff on " The Nutrition of Parasitic Flagellates (Trypanosomidae, Trichomonadinae), the variety and interest attaching to this field of research fostered by her analysis of the growth requirements of these parasites and with ample opportunity for comparative studies clearly indicated, make a strong appeal. A later chapter by the same author on " Nutrition of Parasitic Amoebae " is not so satisfying. In spite of the great volume of work on this subject progress has been slow and disappointing for the reason that satisfactory culture of parasitic amoebae had proved impossible in the absence of one or more bacteria till Phillips succeeded in culturing *E. histolytica* in presence of *Trypanosoma cruzi* alone. It is therefore surprising to find no mention in the present article of this work which should prove of considerable value for the study of growth factors for *E. histolytica*.

The reviewer has read with pleasure and profit recent review articles of Theodor von Brand on subjects allied to that of the present article on " Metabolism of Trypanosomidae and Bodonidae ". Thanks to the method of presentation and impressive array of facts in the present article, the reader's interest is easily sustained throughout. The title is a little misleading since only a few lines are devoted to Bodonidae, which economically are of little importance and have not been widely studied. The subject matter on Trypanosomidae, covering some 60 pages, deals with metabolism in all its aspects and is followed by a section on the Pathological Physiology of the processes discussed earlier. In the review of the causes of injury to the host in trypanosome infections, it would appear that the known facts, whether relating to interference with metabolism of organic and inorganic substances to anoxia or to the production of toxins, need to be reviewed and further correlated before a satisfactory picture is obtained. The interference by drugs with specific intracellular enzymes offers the most reasonable explanation of their activity,

differential toxicity and selective action. Theories on the biochemical and biological mechanisms involved in drug resistance frequently conflict with the experimental evidence.

The chapter on the "Biochemistry of *Plasmodium* and Influence of Antimalarials" by Ralph W. McKee gives an excellent account of the subject and is one of the most complete which has appeared to date, bringing together all known essential biochemical data on human, monkey, avian, and rodent malaria, including the effect of drugs on metabolic processes. A brief outline on the life-cycle of the malaria parasite ensures that the biochemist without a knowledge of protozoology gets an insight into the problems involved. The author was one of a team of investigators who made outstanding contributions on the biochemistry and cultivation of malaria parasites, and his first-hand knowledge of the subject is much in evidence. A brief discussion on some outstanding problems in this field of study concludes an excellent review.

The final article of some 80 pages on "The Biochemistry of Ciliates in Pure Culture" by George W. Kidder and Virginia C. Dewey is devoted largely to the genus *Tetrahymena* which according to the authors "cannot be included in either of the well established genera *Glaucoma* or *Colpidium*". Many of the more recent experimental findings in this field have been contributed by the authors themselves, who consider that some confusion has arisen in the past regarding the exact identity of ciliates used for study. Exhaustive details are given of the inorganic and carbon requirements, nitrogen metabolism and growth factors for *Tetrahymena geleii*. It appears to possess certain enzymes similar to those in higher animals and because of its ability to digest protein, has been used for the biological assay of amino acids. Its value for a study of cellular metabolism and nutrition is indicated. It is, however, difficult to see how it could be employed for chemotherapeutic studies and provide results which would have any general application.

A good start has been made in this first volume in bringing together, in a series of authoritative articles, all pertinent data concerning the biochemistry, physiology, and evolutionary trends of the forms studied. The lucid and stimulating manner of presentation of the subject matter has made pleasant reading and the volume is bound to exercise a wide appeal to both students and research workers. The book is well printed on good paper and contains very few typographical errors. The price, 8.80 American dollars will, however, make many hestitate before acquiring a copy. *J. D. Fulton*

Reynes, V. **Précis d'épidémiologie et prophylaxie des grandes endémies tropicales.** [Handbook of Epidemiology and Control of Major Tropical Endemic Diseases] Préface du Médecin Général Inspecteur Vaucel. 2nd Edition. 403 pp., 27 figs., 2 pls. & 2 charts (1 folding). 1951. Marseilles : M. Leconte, 98, Cours Lieutaud.

The second edition of this book, revised and enlarged, appears within a year of its first publication. In some 380 pages are condensed nearly all essential facts regarding the epidemiology and prevention of all important tropical diseases.

An introductory section is concerned with general epidemiological considerations, the virus, or pathogenic agents of disease ; reservoirs of virus ; modes of transmission ; transmission by arthropods ; meteorological and other factors influencing epidemic prevalence of diseases ; general rules of prophylaxis, etc.

Section II deals with diseases spread by droplet infection, the pneumococcus and meningococcus infections, with special reference to their manifestations in tropical countries.

Section III is concerned with intestinal infections, the typhoid and paratyphoid fevers, the dysenteries, cholera, epidemic jaundices, and the treatment and control of drinking water.

Section IV (148 pages) is devoted to diseases transmitted by arthropods, malaria, the leishmaniases, the trypanosomiases, plague, relapsing fevers, typhus fevers and other rickettsial infections. DDT and other contact insecticides receive adequate notice.

Section V deals with helminths and the pathological conditions to which they give rise.

Section VI treats of tuberculosis, with special reference to its manifestations in warm climates, leprosy and beriberi.

Section VII summarizes procedures laid down in sanitary conventions for the control of the spread of communicable diseases.

Brief notes regarding the geographical distribution and historical importance of some of the diseases preface the relevant chapters. The landmarks in the elucidation of problems connected with aetiology and methods of transmission are noted. The pathogenic agents of most of the diseases are adequately described. Twenty-seven illustrations, mostly of insect vectors of disease and helminths, are useful aids to identification. In nearly every case the descriptions of measures designed for the control or eradication of the diseases, are adequate. Lacunae in epidemiological knowledge are duly noted. Short bibliographies, at the end of most chapters, contain references to recent publications, mostly French as was to be expected.

This little volume should be of great value to French-speaking health workers in the Tropics. *Norman White*

BRAZIL : **Anais VII Congr. Brasileiro de Hig., São Paulo, 12 a 19 Dezembro, 1948.** [Annals of the VII Brazilian Congress of Hygiene, São Paulo, 12–19 December, 1948] v. 1, pp. 1–607 ; v. 2, pp. 609–1149, numerous figs. 1949 : São Paulo.

The Congress of which these volumes contain a record took place in São Paulo in December 1948. The volumes are dated 1949, but have only just come to hand. Within the space of no less than 1,149 pages, they contain a total of 109 papers presented to the Congress. Many of these refer to subjects, to work and to authors with which readers of this *Bulletin* will be familiar : but the ground is fully covered again in the variety of papers now included.

After an introductory account of the Congress itself, the Report opens with a paper by Henry W. KUMM on jungle yellow fever in Brazil. This is based on well-known studies of recent years, and its inclusion in the Proceedings is referred to in the introduction. The remaining papers are largely by local experts and the sessions are divided into 4 sections or " themes ". The first deals with Health Education and contains 21 papers on a variety of aspects of this subject. The second section concerns Rural Hygiene and consists of 55 papers. In addition to the general subject referred to in the title, this section covers such subjects as schistosomiasis, filariasis and other helminthic diseases : the treatment and control of malaria, and in particular the use of insecticides, to which many papers are devoted ; and the entomological aspects of insect vectors. The third section has the title " Epidemiology and Prophylaxis " and refers to these aspects of such diverse infections as poliomyelitis, amoebiasis, trachoma, typhoid, brucellosis and meningococcal meningitis. There are 13 papers in this section. The fourth section deals entirely with Nutrition and covers such points as surveys, dietary régimes, malnutrition, and

vitamins, in a series of 20 papers. Finally, two papers on sanitary engineering complete the Proceedings. Each section is followed by a summary and conclusions.

It would be quite impracticable to attempt to abstract the individual papers (and, indeed, as has been pointed out above, much of the material has already been noted in this *Bulletin*), but readers will wish to be informed of this very large amount of material readily assembled in these two volumes and covering a comprehensive field of public health work in Brazil.

H. J. O'D. Burke-Gaffney

BURGESS, Perry. **Born of those Years. An Autobiography.** pp. xii+307, 26 figs. on 16 pls. 1951. New York : Henry Holt & Co., 257 Fourth Avenue. [$4.00]

Dr. Burgess is not a medical doctor, but few have equalled him in what he has done for the anti-leprosy campaign. For the last 27 years, since its foundation, he has been the president and active executive of the Leonard Wood Memorial, which has not only headed the efforts made against leprosy in America, but has, by its support of the *International Journal of Leprosy*, and by initiating the International Leprosy Association, taken a tremendous share in advancing and coordinating the fight against leprosy throughout the world. Dr. Burgess is also the author of that world-famed best-seller *Who Walk Alone* [this *Bulletin*, 1941, v. 38, 674] which has perhaps done more towards enabling the public to understand and sympathize with the victims of this disease than any other publication. Dr. Burgess travelled over almost every country where leprosy is prevalent, and what he has seen with his kind and understanding eyes is related in this autobiography in a lively and humorous style. There are many stories of heroism, both among the patients and among those who have devoted their lives to these sufferers. One of the remarkable features about *Who Walk Alone* was the scientific accuracy of a book written by a layman. The present work is on the whole no less accurate except in Chapter Thirty, where the question of the need for institutional segregation is discussed. Much of what is said in this chapter is reasonable and wise, but on page 204 it is stated : " in Norway, where the leprosy control regulations are regarded as models, ' home segregation ' is in operation. The number of patients has dropped since 1856 from two thousand eight hundred and fifty to eighteen." However HANSEN and LOOFT, two of those who were chiefly responsible for this reduction, write in their well-known book : " If we examine in this way the numbers in the different districts, we find everywhere that decrease of the disease depends on the numbers isolated in the asylums. Where the isolation was insufficient or absent there was no decrease, but the numbers either increased or remained stationary ; where, on the contrary, isolation was thorough, the decrease was invariable. This can only be explained in one way, viz., that isolation can only have affected improvement by removing from the homes of the people the sources of infection." This was written several years after 1857, in which year a law for partial isolation was first passed. In 1885 a more efficient law was passed under which any community could send those suffering from leprosy to a hospital at public expense, and local authorities had powers to remove patients from their houses if reasonable conditions of isolation were not obtainable at home, including separate beds and eating arrangements under strict medical supervision. The more infective nodular cases were as much as possible sent to the isolation hospitals. The fact is that, given the presence of a few open cases, in some communities the disease will spread and in others it will not. The difference between these two kinds of community may be due to various causes, but the main cause of variance is not so much

in race and diet as in the closeness of contact which the customs, standard of living, etc., of the community impose or permit. The more lax the community is in this respect the stricter the measures necessary to prevent spread of the disease.

Dr. Burgess says : " It is my considered opinion that segregation frequently serves as a deterrent to treatment rather than as a means of obtaining treatment." This no doubt is very true, and if some of the money spent on the upkeep of expensive institutions was spent on suitable personnel who would visit and investigate cases and arrange for domiciliary isolation as far as could safely be allowed, at the same time giving advice suitable to each individual case, then much of the hardship might be removed and leprosy might be better controlled. *Ernest Muir*

MACPHERSON, Kennie. **Mothercraft in the Tropics.** 2nd Edition. pp. xiv+217. 1951. London : Cassell & Co., Ltd. [8*s.* 6*d.*]

The first edition of this book appeared in 1947 and was reviewed in this *Bulletin*, 1947, v. 44, 686. The only major alterations in this edition are the addition of two new chapters, alteration of a table on feeding with full cream dried milk, and reference to modern methods in the prevention and treatment of malaria and scabies.

The new chapter IX consists of 10 pages dealing with the many problems of travelling by sea and air—*e.g.*, food, clothes, luggage, formalities and the like—with which mothers with children may be faced. A brief page and a half dealing with educational facilities, nurseries, nurses and a recipe constitute chapter X.

The inclusion of modern methods of treatment of scabies and malaria is evidently the result of the suggestion to that end made by the reviewer of the first edition in this *Bulletin*. As regards the first of these, the treatment of scabies by the application of benzyl [not benzol] benzoate emulsion (instead of sulphur ointment) is briefly described. In the case of malaria, a page is added which deals with the use of paludrine [proguanil]. While this admirable response to the previous reviewer's suggestion is welcomed, the form in which it is written is unhappy, often ambiguous and in at least one place inaccurate. Firstly it is stated that " no child need be given less than 0·25 gramme ($\frac{1}{4}$ tablet) ". This amount is, in fact, $2\frac{1}{2}$ tablets and it is clear that 0·025 gramme is meant. It is also recommended that a " single dose " treatment of 0·3 gm. be given to achieve clinical cure and that for a radical cure of malignant tertian malaria 0·1 gm. three times daily should be given. No period of treatment is suggested, yet it is stated that " this treatment can be shortened if so desired by giving larger doses over a correspondingly shorter period ". Referring to the radical cure of " benign and tertian malaria " [*sic*] it is stated that present knowledge indicates that after the acute attack is controlled 0·1 gm. should be given weekly " at spaced intervals " for six months. The author rightly states that the question is still being investigated : but not all will agree that in every tropical area and for all types of case the dosages suggested will prove adequate. The same applies to the suggested protective dose of 0·1 gm. twice weekly " at spaced intervals " which is claimed to give complete " casual " [*sic*] prophylaxis. Finally, tables headed " Prophylaxis and Suppression " and " Treatment " give dosages for different age-groups, but again no indication is apparent as to how often these doses should be given : and there is some ambiguity between them and the statements which precede them.

In the interests of clarity this section might well be re-written in the light of authoritative directives [see, for example, this *Bulletin*, 1949, v. 46, 608].

The rest of this edition retains the high quality of its predecessor and should prove extremely useful to those for whom it has been written.

H. J. O'D. Burke-Gaffney

CULWICK, G. M. **Diet in the Gezira Irrigated Area, Sudan.** pp. viii+228, 21 diagrams & 2 coloured folding maps. 1951. Barakat : Sudan Gezira Board.

The Gezira area of the Sudan is the strip of country irrigated from the Sennarddam : it lies between the Blue Nile and the White Nile, and is roughly 200 km. long and 30 km. wide. Since 1925 this area has been devoted primarily to growing cotton. The population previously were semi-nomads alternating between grain cultivation and grazing their flocks. Now they are for the most part a settled community of tenant farmers and farm labourers augmented at times by an influx of seasonal labour from other districts. There are approximately 24,000 tenants, who cultivate about a million acres in co-operation with the Government, who are the landowners and operate the dam, and concession companies who provide capital and equipment for raising, collecting, ginning and marketing the cotton. The average farm holding is 40 acres, of which in any one year about 10 are under cotton and 5 under sorghum, the staple cereal of the people, the remainder being mostly fallow. The people are of mixed origin from many parts of Africa, but all call themselves Arab. There is a characteristic Muslim social structure with the women leading a limited, secluded (but relative secure) life with domestic duties and other activities quite separate from those of the men.

Mrs. Culwick lived for a year in a village in the Gezira named Remeitab with a population of about 625 persons, inhabiting 100 homes. During this time she attempted a systematic quantitative dietary survey of every family in the village, and also made numerous excursions throughout the territory and even beyond into unirrigated districts. In these she collected much qualitative data about the diets of the people. She is clearly an intelligent and close observer of the people and attempts to record accurately the many factors that go to make up their health, wealth and happiness. Most of the report reads interestingly and seems a sensible account of a fascinating people. It is good journalism.

Unfortunately, on the scientific side, the quantitative measurements are disappointing. Mrs. Culwick attempted to carry out this extensive dietary survey with the help of a male clerk-interpreter only. She herself apparently does not speak Arabic fluently. To start on a survey of this sort without a trained staff of assistants was unwise. The many tables of food consumption and the calculation of nutrition are all prefixed : " not to be quoted as average —see text paras. 410-413 ". A reference to these paragraphs shows that the method of collecting the data was quite unreliable. Mrs. Culwick evidently realized the difficulties. Further, she was handicapped by having little medical assistance and advice, and such assistance as she had appears to have been insufficient for adequate appraisal of nutritional assessment.

Nevertheless, having said all this, the report remains valuable. Mrs. Culwick has travelled widely and recorded much. There is probably no need to cavil at her main conclusions. These are firstly that " the primary limiting factor in matters of diet is economic necessity . . . the first step in improving its nutrition is to loosen the grip of poverty ". At the top of the economic ladder in the Gezira, social custom already demands a reasonably good food pattern with vegetables, meats and milk all considered desirable and valued foods. Among the poor the need is essentially for more food. Secondly, though some persons got more than enough to eat, " the general average is at a

level which results in low weights, low average output of physical energy, an inclination to intermittent bursts of energy rather than sustained activity, low general efficiency and altogether a slow rate of living. . . . But we, mopping our brows as we breathlessly try to keep up with the pace of modern life, may well feel inclined to say, What's wrong with that anyway ? And provided the actual hunger at the lowest end of the scale is alleviated, the answer is, of course, nothing at all wrong with it if you want it that way and can manage to keep out of the stream of things to vegetate in peace at a low standard of living. But it will not produce a community able to stand on its feet in the modern world and function successfully within the orbit of western civilisation, which is the challenge this community is facing." [All of this is very interesting, fundamentally important to the Sudan, and probably true. Could not the Sudan Gezira Board, with perhaps the help of the Sudan Government, give Mrs. Culwick a small team of trained nutritional workers and some expert medical assistance, and ask her to survey the diet and health of the people of the Gezira by approved methods ? The information which they would get would be most valuable.] *R. Passmore*

Printed in Great Britain under the authority of HER MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.
(135) Wt. P7/401 5/52 S.E.R. Ltd. **Gp. 432.**

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